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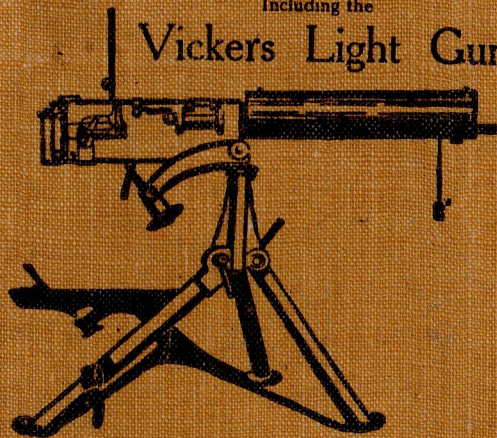
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THE "KINGSWAY" SERVICE SERIES

THE
Machine Gunners'
Handbook

Including the
Vickers Light Gun



Arranged by Sergeant-Major

J. BOSTOCK

School of Musketry

SECOND



EDITION

PRINTED AND PUBLISHED
BY W. H. SMITH & SON
186 STRAND, LONDON, W.C.

TWO AND SIXPENCE NET

Entered at Stationers' Hall

Handbook

H, 1914.

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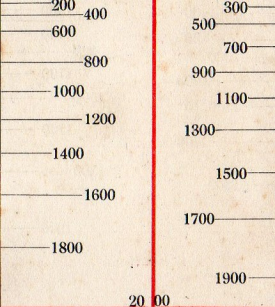
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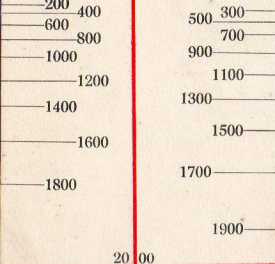
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The Graticule Card

To be held 18" from eye

**For
MARK VI. AMMN.**



The
Graticule Card
To be held 18" from eye

For
MARK VII. AMMN.

THE
MACHINE GUNNER'S
RANGE & TRAJECTORY CARD WITH
ANGLES OF ELEVATION ETC., FOR
MARK VI AMMUNITION.

Range. Yards.	Approximate Angles of Elevation.		Rise in Minutes.	Culminating Point of Tra- jectory in Feet.
	Degrees.	Mins.		
100	—	10	—	—
200	—	14	7	—
300	—	21	6	1
400	—	27	8	2
500	—	35	9	3½
600	—	44	13	6
700	—	56	13	9
800	1	10	12	13
900	1	23	15	17½
1,000	1	38	15	23½
1,100	1	53	16	31½
1,200	2	11	18	41
1,300	2	28	20	52
1,400	2	49	20	66
1,500	3	9	21	82
1,600	3	30	25	100
1,700	3	55	25	122
1,800	4	22	28	146
1,900	4	50	29	174
2,000	5	20	32	206
2,100	5	53	37	241
2,200	6	29	38	282
2,300	7	11	47	325
2,400	7	57	47	374
2,500	8	46	52	429
2,600	9	39	55	489
2,700	10	37	59	558
2,800	11	37	62	637
2,900	12	41	—	—

[SEE OVER.

TRAJECTORY DISCS.

ILLUSTRATING THE CONE OF FIRE AS IT WILL APPEAR IN OVER HEAD FIRE, ETC.

Range	Diameter of Discs.				Height of Centre of Disc above ground, Muzzle of Gun is taken as being 20 inches above ground.					
	75% Cone		100% Cone		700 yards Trajectory.		800 yards Trajectory.		900 yards Trajectory.	
Yards	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.
100		8½	2	0	5	5	6	5	8	8½
200	1	3½	3	6	8	6	10	6	12	10
300	2	0	5	0	10	2	13	4	16	10
400	2	8½	6	6	10	7	14	8	19	6
500	3	6	8	0	9	4	14	2	20	2
600	4	0	10	0	5	11	12	1	19	0
700	4	6	12	0	—	—	7	6	15	6
800	5	6	14	0	—	—	—	—	9	1
1,000	6	8	16	0	—	—	—	—	—	—
1,500	10	0	24	0	—	—	—	—	—	—
2,000	13	4	32	0	—	—	—	—	—	—

DEPTH OF ZONE BEATEN BY 75% OF SHOTS FIRED FROM A MAXIM GUN.

Dispersion of Cone.	500	1,000	1,500	2,000	Yards Range.
DEPTH	150	70	60	50	Yards.
WIDTH	4	8	13	19	Feet.

PROBABLE ERRORS IN RANGING TO BE ALLOWED FOR WHEN DIRECTING FIRE.

Method of Ranging.	P.C. of Error.	Extent of Ground to be searched to overcome probable errors in Ranging.				
		500	1,000	1,500	2,000	Range.
Judging Distance.	15	150	300	450	600	Yards
Judging Distance Combined with "Key Ranges."	10	100	200	300	400	"
Mekometer . . .	5	50	100	150	200	"
Marindin . . .	3	30	60	90	120	"

[SEE OVER

MARK VII AMMUNITION.

Angles of Elevation.	Angle of Descent.	Culminating Point.	Trajectory Discs.		Lowest shot 100% Cone below Centre of Disc.	Height of Centre of Disc above ground.				
			Vert.	Hor.		700 yds.	800 yds.	900 yds.		
100 yds	12' 5"		11"	6"	1'	1"	3'	5"	0"	
200 "	15'		10"	0"	2'	2"	5'	8"	8'	
300 "	18' 5"		9"	6"	3'	3"	6'	9"	11"	
400 "	22' 5"		8"	0"	4'	4"	6'	9"	11'	
500 "	27'	1.3ft.	8"	0"	5'	5"	6'	11"	13'	
600 "	32' 5"	2.3ft.	7"	6"	6'	6"	5'	11"	13'	
700 "	38' 5"	3.8ft.	6"	0"	7'	7"	8'	10"	13'	
800 "	46'	6.1ft.	5'	6"	8'	8"	—	10"	13'	
900 "	54'	8.9ft.	4'	0"			5'	8'	10'	
1000 "	1° 3' 5"	12.8ft.					—	—	7"	
1100 "	1° 14' 5"	17.8ft.								
1200 "	1° 27'	24.1ft.								
1300 "	1° 41'	32.4ft.								
1400 "	1° 57'	42ft.								
1500 "	2° 15'	54ft.								
1600 "	2° 35'	69ft.								
1700 "	2° 58'	87ft.								
1800 "	3° 23' 5"	108ft.								
1900 "	3° 52'	132ft.								
2000 "	4° 24'	161ft.								
		195ft.								
Heights of Trajectories above Line of Sight at 800 yds.						At 100 yds.				2' 9"
						At 200 "				5' 7"
75% Zones: 500 yds 220 yds 1,000 yds 140 yds 1,500 70 yds						At 300 "				7' 6"
						At 400 "				8' 8"
						At 500 "				8' 9"
						At 600 "				7' 6"
						At 700 "				4' 8"

Machine Gunners' Handbook

AMENDMENTS, MARCH, 1914.

Tests of Elementary Training.

- Page 132, line 23—For 30 substitute 20.
,, 133, ,, 4 ,, 6 ,, 5.
,, 134, ,, 9-11, delete from "the" to "test."
,, 134, ,, 11—For 6 substitute 5.
,, 134, ,, 22 ,, 20 ,, 15.
,, 136, ,, 1 ,, 2 seconds substitute 1 second.
,, 136, ,, 2 ,, 8 substitute 5.
,, 136, ,, 3rd from bottom—For 5 substitute 3.
,, 137, ,, 1—For 32 substitute 19.
,, 137, ,, 2 ,, 30 ,, 18.
,, 137, ,, 2 ,, 2 seconds substitute 1 second.
,, 137, ,, 15—For 6 substitute 4.
,, 139, column 3, should be amended in accordance with the times given above.

Badges.

Page 160. Add at foot of page:—

Machine-gun Badges.—Regular Cavalry and Infantry. A badge for first-class machine gunners consisting of the letters "M.G." within a wreath to be worn on the right forearm.

The machine-gun badge may be worn in addition to and above the marksman's badge, but may not be worn in addition to the badges mentioned in para. 597, i., ii., and iii. Mus. Reg.

R. G. A. (Special Res.) Course.

Page 162. Delete para. 2 (Special Reserve) and substitute following :—

*Machine Gunners of Royal Garrison Artillery (Special Reserve) allotted to armament guns of coast defences.
Machine Gun Course.*

Part I., Table "C" to be fired as laid down in pages 163 and 164 as far as ammunition allotted (100 rounds) permits; 10 rounds only will be allotted to practice 4 instead of 20 rounds. Total 100 rounds.

For classification, repeat Part I., Table "C" as modified, viz. :—

Practice	Rounds	Conditions for Classification
1	6	<i>1st class.</i> —3-in group. One wide shot allowed
2	7	<i>2nd class.</i> —4-in. group. One wide shot allowed
		<i>1st class.</i> —Not more than 2 spaces
		<i>2nd class.</i> —Not more than 3 spaces
3	12	<i>1st class.</i> —3-in group. One wide shot allowed ;
	(6 to each group)	point of mean impact to be within the rectangle vertically above the figures indicated
		<i>2nd class.</i> —As above, except a 4-in group and one wide shot allowed
4	...	Not included in classification
5	50	As for Practice 2
6	15	<i>1st class.</i> —Not more than 6 spaces
	(single shots)	<i>2nd class.</i> —Not more than 8 spaces

Ammunition—

	Rounds.			
Instructional	100
Classification	90
Surplus, at machine-gun officer's disposal				10
Total	<u>200</u>

Notes.—1. A space means a horizontal interval not greater than 3 inches and not less than 1 inch between bullets in Practices 2 and 6 or between the nearest bullets of adjacent groups in Practice 5.

2. In Practice 2 (classification practices) it is not necessary that the shots should be in the band.

3. In Practice 6 (classification practices) shots to count must be within the diagonal bands.

4. In Practices 2 and 6, tapping backwards to correct faulty traversing will not be allowed.

5. When repeating Class 1 for classification, a practice will be completed by the firer without any assistance or criticism until its conclusion.

Special Reserve and Territorial Force.

Page 162, line 7—After Table “C” insert “Special Reserve and.”

Page 162, line 9—Add “Special Reserve (except R.G.A.) and.”

Coast Defence. M. Gun Detachments.

Page 162.—At foot of page add:—

COAST DEFENCE.

Regulars, Special and Extra Reserve, and Territorial Force, non-commissioned officers and men of detachments allotted to coast defence machine guns will carry out the following courses:—

(i.) *1st and 2nd years as machine gunners—*
Part I., Table “C.”

(ii.) *3rd and subsequent years—*
25 rounds per man will be fired in practices, 1, 2, and 3, Part I., Table “C.”

150 rounds will be fired in practical exercises to be framed by coast defence commanders against such targets as may have to be engaged in war.

The surplus 25 rounds will be at the disposal of coast defence commanders for repetition of indifferent shots, ranging bursts, &c.

INSTRUCTIONS.

- (a) Each man of Regular Artillery and Infantry of the machine-gun detachment detailed to armament machine guns, in addition to firing the annual course, will be trained for at least 2 days in every month with the guns that would be used on mobilization.

There is no objection in cases where it may be more convenient and advisable to detail the machine-gun detachments for 24 consecutive days' practice instead of 2 days monthly.

- (b) *Special and Extra Reserve and Territorial Force.*—The training of the machine gunners is not to aim at a high technical standard. The short time available for training should therefore be devoted to preliminary work and in giving thorough instruction in the mechanism and manner of firing the weapon.

The training should, as far as possible, be as follows.—

Handbook, '303-inch Maxim Gun, Part I.

Infantry Training, Section 9, paragraphs 1 and 3 to 7 inclusive. Sections 114 to 117 inclusive and Section 166.

Musketry Regulations, Part I. (reprint), paragraphs 279 and 280; Chapter V., paragraphs 641 to 645, first line only.

- (c) *Special and Extra Reserve.*—The firing of the annual course, if possible, will not be carried out until after the execution of the annual rifle (musketry) course.
- (d) *Territorial Force.*—Machine gunners detailed to armament coast defence guns will, in addition to firing their annual machine-gun course, be exercised as frequently as possible with the guns which they would be required to man on mobilization.

Note.—Machine gunners allotted to coast defences (except men of the Royal Garrison Artillery of the Territorial Force), will also fire their annual course of musketry. They will not be classified on their firing with armament machine guns.

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THE Machine Gunners' Handbook.

Including the
Vickers Light Gun

Arranged by
Sergeant-Major
J. BOSTOCK,
School of Musketry.

SECOND EDITION.

PRICE 2/6 NET.

**PRINTED & PUBLISHED by W. H. SMITH & SON
186 STRAND**

Entered at Stationers' Hall.



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INTRODUCTORY.

These notes show, in some measure, the system followed at the School of Musketry, Hythe, in giving effect to the instructions laid down in the Official Text Books on Machine Guns; and are compiled with a view to assisting instructors in framing a correct sequence of instruction, and with the desire to increase interest in what is undoubtedly the weapon of the future.

The chapters have been arranged in their natural order of sequence, showing a progressive method of training; but it must be understood that instruction in the mechanism of the gun; in the drill and methods of laying, ranging, and firing; in packing and unpacking limbered wagons; in filling a belt quickly and correctly; in the use of the range finder, etc., will all form part of the daily training of a Machine Gun Section, to afford practice in these most important matters, and also as a means of varying the subjects to be taught.

The second edition of *THE MACHINE GUNNERS' HANDBOOK* also introduces the new Vickers Light Machine Gun, showing the points of difference between the Maxim and Vickers .303 inch Gun, giving the general advantages of the Light Gun and the Action of the Mechanism.

This gun will be dealt with more fully in future editions of this book.

May, 1913.

J. B.

GENERAL DESCRIPTION.

METHOD OF IMPARTING INSTRUCTION.

General description should be brief, the main idea being to show the principles on which the gun works, before going into the detailed working of the gun.

Names of various parts are better taught as they are met with during instruction in mechanism.

1. Explain briefly that the gun is divided into two portions—the non-recoiling and the recoiling, and when firing, is worked automatically by two forces: *The explosion*, which forces the recoiling portion backwards and opens the breech, and the *fusee spring*, which carries it forward, and closes the breech.

2. Remove the fusee spring box, open the cover, and by pushing back the muzzle demonstrate the effect of the explosion upon the recoiling portion. The action of the fusee spring may next be shown by moving forward the recoiling portion, the right hand holding the crank handle vertical while the fusee is held in the left hand. While moving the recoiling portion backwards and forward, the instructor explains that this automatic action continues as long as pressure is maintained on the double button.

3. The high rate of fire produces abnormal heating of the barrel, which leads to the con-

sideration of the cooling apparatus, therefore discuss:

- (a) The water supply.
 - (b) How applied and retained in the barrel casing.
 - (c) Steam tube and steam escape.
 - (d) Rate of evaporation, and orders for replenishing water.
4. If found necessary to mention weights—
Gun = 60 lbs. (Mark II, Converted = 64 lbs.),
Tripod = 48 lbs.
Box and Belt-filled = 21 lbs.

The above forms a brief but useful lesson in description of the gun. It has already been hinted that it is waste of time to endeavour to teach names of parts at this lesson. Gunners should, therefore, proceed to instruction in the action of mechanism without delay.

For detailed *description of .303 inch Maxim Gun* see pages 2-15.

GENERAL DESCRIPTION.

Weight of the .303" gun, 60 lbs. Mark II, Converted, 64 lbs. Weight of the tripod, 48 lbs.

Weight of ammunition box containing one filled belt, 21 lbs.

The gun may be considered as divided into two portions—the non-recoiling and the recoiling. It is worked automatically by two forces: the explosion of the charge which forces the recoiling portion backwards, and

a strong spring (called the fusee spring) which carries it forward.

NON-RECOILING PORTION.

The non-recoiling portion consists of the barrel casing and breech casing, and is attached to the mounting by the crosshead and elevating joint pins.

The *barrel casing* is of gun metal, holding about seven pints of water to keep the barrel cool when firing; it has three openings, one on the upper right side near the breech for filling, one underneath near the muzzle for drawing off the water, and the third (also near the muzzle) for allowing the steam but not the water to escape.

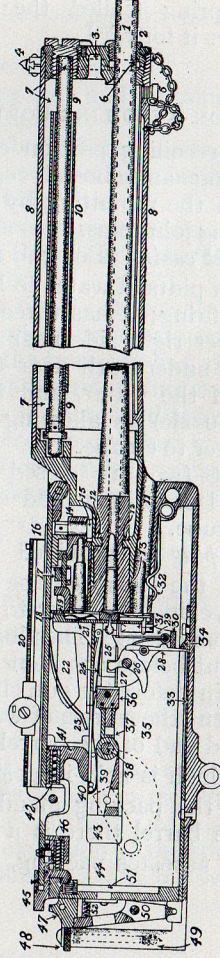
The first two are closed with screwed plugs, the last is open and connected with the steam tube.

A *cork plug* is provided which can be inserted in the steam escape hole when the gun is travelling, in order to prevent waste of water from jolting. The plug should always be taken out before commencing to fire, and put in again before the gun changes position.

To prevent the escape of water, there is at the forward end of the barrel casing *asbestos packing*, which is held in position round the barrel by the packing gland. At the rear end of the barrel there is a *cannelure*, also filled with asbestos packing, which prevents

Plate I

·303-INCH MAXIM MAGAZINE RIFLE CHAMBER MACHINE GUN. LONGITUDINAL SECTION SHOWING GUN READY FOR FIRING.



LIST OF PARTS AS SHOWN IN PLATE I.

- | | | |
|-------------------------------------|--------------------------------|------------------------------------|
| 1. Barrel. | 17. Feed Block Slide. | 35. Breech Casing. |
| 2. Packing Gland. | 18. Upper Extractor Stop. | 36. Screwed Head. |
| 3. Steam Escape Hole. | 19. Extractor. | 37. Connecting Rod. |
| 4. Foresight. | 20. Tangent Sight. | 38. Crank Pin. |
| 5. Screwed Plug for Emptying. | 21. Gib Spring. | 39. Crank. |
| 6. Asbestos Packing. | 22. Side Cams. | 40. Connecting Rod Spring. |
| 7. Holes in Steam Tube. | 23. Cover Spring. | 41. Gun-metal Block. |
| 8. Barrel Casing. | 24. Sear. | 42. Tangent Sight Spring. |
| 9. Steam Tube. | 25. Firing Pin. | 43. Side Plates. |
| 10. Slide Valve. | 26. Tumbler. | 44. Slides, Right and Left. |
| 11. Ejector Tube. | 27. Lock Casing. | 45. Cover Lock. |
| 12. Cannelure for Asbestos Packing. | 28. Trigger. | 46. Cover Lock Spring. |
| 13. Gun-metal Valve. | 29. Lock Spring. | 47. Safety Catch. |
| 14. Feed Block. | 30. Keeper Bracket. | 48. Milled Heads with Oil Brushes. |
| 15. Bottom Lever Feed Block. | 31. Extractor Stop. | 49. Handles. |
| | 32. Ejector Tube Spring. | 50. Firing Lever. |
| | 33. Trigger Bar. | 51. Shutter. |
| 16. Top Lever Feed Block. | 34. Projection on Trigger Bar. | 52. Firing Lever Spring. |

the escape of water when the gun is working, and a *gun-metal valve* immediately in front of the barrel block, which prevents the escape of water when the gun is not firing and the barrel home.

The *steam tube* consists of a fixed tube and an outer tube, termed the *slide valve*, so arranged as to slide freely along the fixed tube. In the fixed tube there is a hole near each end, and a third hole in the threaded portion in front, to connect with the steam escape hole in the barrel casing. This tube is fixed into the solid end of the barrel casing, and is retained in position by a screw, which, being kept in adjustment by a keeper screw, ensures that the third hole coincides with the steam escape hole in the barrel casing. At the breech end it fits into a recess.

If the gun is fired with elevation, the valve slides backwards, and, closing up the hole at the rear end of the tube, prevents the water entering; at the same time it leaves the front hole uncovered, which, being above the water level, allows the steam to enter the tube and escape through the steam escape hole, which is bored in the solid part of the front end of the barrel casing. Similarly, if the gun is fired with depression, the valve slides forward and allows the steam but not the water to escape through the rear hole.

In the lower part of the barrel casing is the *ejector tube*, through which the empty

cartridge cases are ejected from the gun. The tube is fitted with a spring, which prevents the cases falling backwards into the gun.

The *breech casing* consists of two outside plates, a bottom plate, which is riveted to them, and the rear cross piece, the whole being closed by a cover.

The outside plates are dovetailed into the barrel casing and, together with the cover, are secured by means of the cover joint pin.

On the outside of the right-hand plate there are the following fittings: (1) A socket and stud for securing and supporting the *buffer spring*; (2) the *resistance piece*; and (3) the *check lever*, which pivots on a stud and is secured by a collar and split pin. On the outside of the left-hand plate are three studs for holding the fusee spring box, the rear one being on the slide mentioned below; there are also two other studs on this plate for fixing a shoulder piece to the gun if required. In both plates are slots partly closed by slides, in which the crank bearings move, and on the inside of both plates are *solid cams*, which control the path of the extractor. Below these, and supporting the side plates, are rests, along which the recoiling portion travels.

Along the bottom plate lies the trigger bar, and underneath is a bracket to which the

elevating gear is attached by means of the elevating joint pin.

The outside plates are connected at the rear end by the *rear cross piece*, into which they both dovetail; this piece is fitted with (1) hollow handles for traversing, which are also used for carrying oil, and are closed by milled heads, fitted with camel hair brushes; (2) a *firing lever* and spring, the lower end of which fits into the trigger bar, while the upper end is provided with a double button for firing; (3) an automatic *safety catch*, which is so arranged that unless it is held up the firing lever cannot be pressed forward; and (4) a pivoted *shutter*, which, when moved to the right or left, uncovers an aperture through which (when the lock is removed and the crank handle vertical) the barrel can be inspected or cleaned from the rear.

The *cover* is fitted with (1) springs to ensure the extractor dropping on recoil; (2) a gun-metal block to keep the lock down when back; and (3) at the rear end, a lock to fasten it. On the upper surface is the *tangent sight*, which is graduated up to 2,800 yards.

RECOILING PORTION.

The *recoiling portion* (which is mounted inside the non-recoiling portion) consists of the barrel and two side plates which carry the lock and the crank.

The *barrel* is coated with copper to prevent it from rust; the *gun-metal valve* referred to above, which prevents the escape of water to the rear, is fitted just in front of the breech end, which is formed in the shape of a block; this block has a stud on each side called the *barrel trunnions*, by means of which the barrel is attached to the side plates.

The *side plates* are each provided with a hole to receive the barrel trunnions, and in the case of the .303" hooks for engaging the recesses on the top of the barrel block; also guides in which the flanges of the lock move, which are enlarged at the rear end to act as crank stops; in addition, each has a *bearing*, through which the crank passes, thus connecting the latter with the barrel; these bearings move in slots in the breech casing. The left-side plate is fitted with a *connecting rod spring* to hold the connecting rod upright when the lock is removed, and the right side-plate is fitted with a *side plate spring* near the barrel, to keep the extractor in its highest position when the lock is home. The left side-plate is prolonged to the front, and has a recess in which the bottom lever of the feed block engages.

The *crank* is fitted with a connecting rod, which is free to rotate on the crank pin, and, outside the breech casing on the right, with a handle which has a curved projecting arm,

and on the left with a fusee, to which is attached a chain.

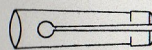
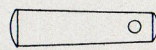
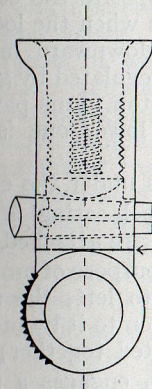
The *connecting rod* is attached to the crank by means of an axis pin, called the *crank pin*, and is arranged to take the lock by means of an interrupted screw, thereby connecting the crank and lock. The connecting rod is divided into two parts, enabling its length to be increased by inserting washers of varying thickness. By this means it is ensured that a firm pressure is kept on the base of the cartridge at the moment of firing, thus preventing separations.

On the left of the breech casing there is a strong spiral spring, called the *fusee spring*, the rear end of which is connected by the fusee chain and fusee with the crank; the fore-end is attached to the breech casing by means of the fusee spring box and *adjusting screw*, which passes through the front end of the fusee spring box, and through the nut at the front end of the spring.

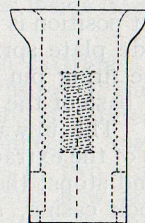
The *lock* is attached to the connecting rod by the screwed head, and when in the firing position closes the breech. In this position it is held by the side levers, the crank (which bears against stops on the side plates) and the connecting rod, which are all slightly above the horizontal, to prevent the breech being opened at the moment of firing. The lock has a reciprocating motion communicated to it by the rotation of the crank, and is

Plate II.

ADJUSTABLE CONNECTING ROD, MARK II.

SPRING
COTTERSOLID
COTTER

POSITION OF WASHER



WASHER

kept in position during its backward and forward movements by means of flanges working in guides on the side plates, and, when at the end of its backward travel and clear of the guides, by the gun-metal block underneath the cover.

The extractor is moved upwards by means of the side and extractor levers, and when in its highest position is retained there by means of the side plate spring; this ensures the hole for the firing pin being opposite the centre of the base of the cartridge when the lock is home. The upward and downward movements of the extractor are regulated by guide ribs and stops; the upper stop forms part of the lock casing, and the lower one is removable.

The feed block, which fits under the cover into a recess cut in the breech casing, is provided with a slide to which are attached two pawls with springs, for the purpose of moving the cartridges from right to left; the slide has a transverse motion given to it by means of two levers, which are fitted together; the top lever has a slot which engages a stud on the slide, and on the bottom lever is a stud which engages in a recess in the left side plate; by this means the slide is connected with the recoiling portion. The feed block has also two stationary pawls, which engage under the belt and prevent it slipping backwards during firing. To facilitate the

entrance of the cartridges, the feed block is provided with a band roller, and in addition has steel guides fitted above and below in the cartridge way, which ensure the cartridges coming to the exact position where they can be seized by the extractor; they are prevented from being pushed too far through to the left by means of the cartridge and bullet stops, which are inside the feed block.

The gun is supplied with cartridges from a belt which passes from right to left through the feed block. This belt is formed by two pieces of webbing connected together by eyelets and brass strips of two lengths, the projecting strips showing how far the cartridges should be inserted; the belt is made thick at the edge next the bullets by being folded over a piece of cord, so that the cartridges may be kept parallel in passing through the feed block, and lie evenly in the ammunition belt boxes.

Ammunition.—All marks of .303-inch ball ammunition may be used, but care should be taken to select ammunition of the most recent manufacture.

CONVERTED GUNS.

Converted Guns are the original .45-inch guns made to take the .303-inch cartridge. The conversion consists in the substitution of .303-inch barrels for the .45-inch barrels,

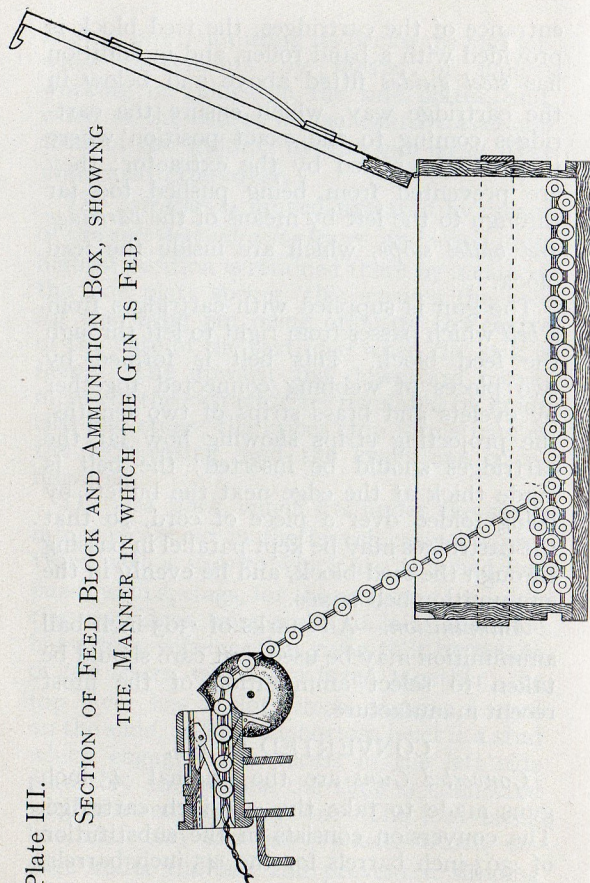


Plate III.

SECTION OF FEED BLOCK AND AMMUNITION BOX, SHOWING
THE MANNER IN WHICH THE GUN IS FED.

and the adaptation of the mechanism to the smaller calibre, by the introduction of new parts or the alteration of existing parts.

The Mark II differs from the Mark I in being fitted with the service .303-inch barrel and muzzle attachment for ball firing, whereas the Mark I has a special muzzle attachment and a heavy barrel. In both Marks I and II Converted Guns the attachment for ball firing must always be on the guns, as, owing to the greater weight of the component parts, these guns will not work without it. The tangent sight is graduated to 2,500 yards. The weight is 64 lbs. In other respects they resemble the .303-inch gun, except that the connecting rod is not above the horizontal, and that there is a space of about 1-10th of an inch between the projecting arm of the crank handle and the resistance piece.

ACTION OF MECHANISM.

It is not alone sufficient for a high standard of knowledge of mechanism to be reached; it must also be maintained, and therefore instruction should be continuous throughout the year, for it is easily forgotten if neglected.

A theoretical knowledge of mechanism is not sufficient. Instruction must be so

thorough and practical as to ensure that all mechanical operations are performed correctly from force of habit, so that they will be carried out instinctively in moments of excitement.

A belt and dummy cartridges will invariably be used for purposes of instruction.

A Service lock must always be in the gun when firing either ball or blank ammunition. For instructional purposes, when ammunition is not being fired, the D.P. (instructional) lock should be used in the gun whenever possible.

The following is the correct sequence in which instruction in mechanism should be given; each stage must be thoroughly understood before proceeding to the next:

LOADING.

To Load the Gun.—Pass the tag end of the belt through the feed block from the right side; then, with the right hand, turn the crank handle on to the buffer spring, and with the left hand pull the belt straight through as far as it will go, let go the crank handle; the first cartridge will then be gripped by the extractor. Repeat the above, and when this has been done, the first cartridge will be in the chamber and another gripped by the upper part of the extractor. The gun is then ready for firing.

On pressing the double button, the gun will fire automatically until pressure is

released. The lock will then be home, and the extractor will be found to be gripping—(a) a live cartridge in the feed block, (b) a live cartridge in the chamber; and there will also be an empty case in ejector tube.

BACKWARD MOVEMENT OF THE RECOILING PORTION.

Action on Recoil.—Suppose the gun to have just fired, the extractor will then be gripping a live cartridge in the feed block, and the case which has just been fired in the chamber. The explosion causes the recoiling portion to move backwards through a distance of about one inch, thereby extending the fusee spring.

Action in the Feed Block.—A recess in the prolongation on the left side plate actuates a stud on the bottom lever of the feed block. The bottom lever acts on the top lever, which moves the slide and the top pawls to the right, to engage behind the cartridge held in place by the bottom pawls.

Rotation of the Crank.—The backward movement of recoil causes the projecting arm of the crank handle to roll on the resistance piece, thereby rotating the crank. The rotation of the crank draws back the lock, throws the crank handle on the buffer spring, and causes the fusee to wind the fusee chain round it, further extending the fusee spring.

As the lock moves backwards, the extractor withdraws the empty case from the chamber and a live cartridge from the belt in the feed block. The horns of the extractor move along the upper surface of the solid cams until the cartridge is clear of the belt. When the extractor arrives at the rear end of the cams, it falls—partly by its own weight, and partly by the action of the cover springs, thus bringing the cartridge drawn from the feed block in line with the chamber, and the empty case drawn from the chamber in line with the ejector tube. The empty case and live cartridge are prevented from slipping down the face of the extractor by the extractor spring and by the lower projection of the gib respectively. When the lock is quite back, its flanges are clear of the guides on the side plates, and it is kept in position by the gun-metal block on the cover.

Cocking Action.—The rotation of the crank gives a downward motion to the connecting rod and screwed head, which latter, bearing on the tail of the tumbler, rotates it on its axis, and thus forces the firing pin to the rear. The long arm of the lock spring is engaged in a recess in the front of the firing pin, while the short arm bears against the nose of the trigger; consequently, the withdrawal of the firing pin compresses the lock spring by drawing the long arm towards the short one. As the

tumbler rotates, the nose of the trigger is forced by the short arm of the lock spring under the bent of the tumbler, and the continued motion of the tumbler forces the firing pin still further back, until the bent of the sear (which is actuated by the sear spring) is forced into the bent of the firing pin and retains it. The firing pin is thus prevented from flying forward.

FORWARD MOVEMENT OF THE RECOILING PORTION.

Action of the Fusee Spring.—When the force of recoil is expended, the action of the fusee spring comes into play, carrying the recoiling portion forward.

Action in Feed Block.—As the recoiling portion travels forward, the recess in the prolongation on the left side plate actuates the stud on the bottom lever of the feed block. This bottom lever acts on the top lever, which moves the slide and the top pawls to the left, the pawls thus bringing a fresh cartridge in the belt to a position against the cartridge and bullet stops, ready to be gripped by the extractor.

The belt, as it moves to the left, slides over the bottom pawls, which are depressed as the cartridge passes over them, and rise behind the second cartridge, holding the belt in position and preventing it from sliding back after the first cartridge has been withdrawn by the extractor.

Rotation of Crank.—Owing to the unwinding of the chain from the fusee, assisted by the rebound of the crank handle from the buffer spring, the crank is given an upward motion, which is imparted to the connecting rod and screwed head. This causes the lock to move forward, placing the live cartridge and the empty case respectively in the chamber and ejector tube; the extractor is moved upwards by the side levers acting on the extractor levers, the extractor spring slides over the empty case, thereby leaving the empty case in the ejector tube, where it is held by the ejector tube spring until pushed out by the next case. The lower projection of the gib slides over the base of the live cartridge in the chamber; the firing pin hole is thus brought opposite the cap, and a fresh cartridge, which has been automatically moved up into position in the feed block, is engaged.

As soon as the extractor reaches its highest position, the side plate spring engages in a slot in its side and retains it there; with worn extractor levers, the extractor might otherwise fall again, and the horns fail to clear the solid cams for backward movement.

FIRING ACTION.

(a) *For the First Shot.*—As the screwed head rises slightly above the horizontal, it lifts the sear, thereby disengaging

it from the firing pin, which then moves slightly forward till the bent of the tumbler engages the nose of the trigger. If the double button on the firing lever is now pressed, the trigger bar is drawn backwards until the projection on it engages and draws back with it the tail of the trigger, thereby releasing the tumbler. The long arm of the lock spring then propels the firing pin on to the cap and explodes the cartridge. (b) *For Subsequent Shots.*—The firer, by maintaining pressure on the double button, holds back the trigger bar. Therefore, each time the lock goes forward, the projection on the trigger bar holds back the tail of the trigger before the lock is quite home. By this means the nose of the trigger is prevented from engaging in the bent of the tumbler. On the lock getting home, the screwed head lifts the sear, thus permitting the lock spring to carry the firing pin on to the cap and explode the charge.

The lifting of the sear is so timed that the firing pin cannot be released until the lock is in the firing position.

Action inside Lock when Double Button is Released.—On releasing the double button, the short arm of the lock spring forces the nose of the trigger under the bent of the tumbler, so that when the sear is lifted, the nose of the trigger engages in the bent of the tumbler, and the firing pin is unable to go forward.

UNLOADING.

To Unload the Gun.—Turn the crank handle on to the buffer spring twice in succession, letting it fly back to the check lever each time; press up the bottom pawls and remove the belt from the feed block. Then release the lock spring.

SUMMARIZED SEQUENCE OF INSTRUCTION IN ACTION OF MECHANISM.

Having thoroughly studied the detailed action of mechanism, the instructor will find it useful to briefly memorise it as follows:—

1. How to load the gun.
2. *Backward movement of recoiling portion.*
 - (a) Action on recoil.
 - (b) Action in the feed block.
 - (c) Rotation of the crank.
 - (d) Cocking action.
3. *Forward movement of recoiling portion.*
 - (a) Action of fusee spring.
 - (b) Action in feed block.
 - (c) Rotation of crank.
4. Firing action—(a) For first shot; (b) For subsequent shots.
5. Action inside lock when double button is released.
6. To unload the gun.

MUZZLE ATTACHMENT FOR BALL FIRING.

(See Plate IV.)

(i) In order to increase the force of recoil a muzzle attachment is provided. It is to be used when, on account of a badly worn lead, dirt, dried oil, or the water freezing in the barrel casing, the recoil of the barrel is insufficient to work the gun after the usual remedies of adjusting the fusee spring, and oiling the working parts, have been tried. It is screwed into the packing gland seating at the front end of the barrel casing, the screwed end of the attachment acting as a packing gland.

(ii) The attachment consists of a steel cylinder with a hole bored longitudinally through it. The front end of this hollow cylinder is partially closed by the screw.

(iii) The action of the attachment is as follows: The powder gases escape from the muzzle of the barrel, and are partially confined in the interior of the attachment at a high pressure. The pressure of the gas, acting on the muzzle of the barrel, gives the additional recoil necessary to work the mechanism of the gun. The screw should be tightly screwed up before putting the attachment on; it is only to be unscrewed when the attachment requires cleaning.

(iv) When the attachment is taken into use to overcome a defect in the working of the gun, the fusee spring, if already lowered,

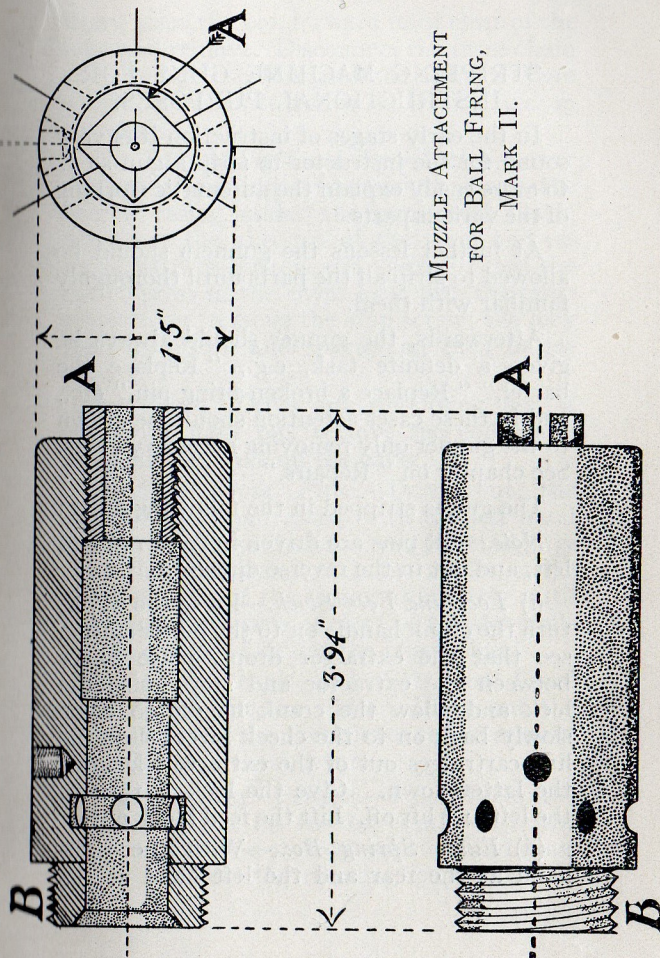
should be brought up to its normal weight; when it is used for instructional purposes on a gun in good working order, the weight of the fusee spring should be increased by $2\frac{1}{2}$ – $3\frac{1}{2}$ lbs., above normal. In every case, however, the spring should be further adjusted, if necessary, so as to obtain a rate of fire of 450 rounds per minute (500 rounds per minute with Mark VII .303-inch ammunition).

(v) *To fix the attachment*, unscrew the packing gland from the barrel casing. Screw the attachment into the gland seating of the barrel casing by means of the gib key. If water is found to escape when fitting the attachment, the elevating joint pin should be removed, and the rear end of the gun lowered.

(vi) On the first opportunity the gun should be thoroughly cleaned and examined, so that it may be used without the assistance of the ball firing attachment.

(vii) In the case of Converted Guns, the muzzle attachment should be cleaned after firing as follows: Remove it from the gun; take out the front screw, and then, with the special cleaner supplied, carefully scrape away the metallic fouling from the face of the screw and the inside of the attachment. The end of the barrel should also be cleaned, but great care should be taken to avoid scraping off the copper. No. 1 cleaner is for use with the Mark I Converted Gun. No. 2 cleaner is for use with the Mark II Converted Gun, or, if available, with the .303-inch Gun.

MUZZLE ATTACHMENT
FOR BALL FIRING,
MARK II.



STRIPPING MACHINE GUNS FOR INSTRUCTIONAL PURPOSES.

In the early stages of instruction it is very sound for the instructor to strip a gun so as to more easily explain the automatic working of the various parts.

At further lessons the gunners should be allowed to strip all the parts until thoroughly familiar with them.

Afterwards, the gunner should always be given a definite task, e.g., "Replace the barrel," "Replace a broken firing pin," etc., and in these cases attention should be drawn to the gunner only removing necessary parts. See chapter on "Repairs."

The gun is stripped in the following order:

Note.—All pins are driven in from right to left, and out in the reverse direction.

(i) *Lock and Feed Block.*—Raise the cover, turn the crank handle on to the buffer spring, see that the extractor drops, place finger between the extractor and stop, raise the lock and allow the crank handle to come slowly back on to the check lever; slide the live cartridges out of the extractor, keeping the latter down. Give the lock $\frac{1}{8}$ turn to the left and lift off. Lift the feed block out.

(ii) *Fusee Spring Box.*—With the right hand at the rear and the left hand at the

front, press the box forward until clear of the lugs, and remove. Disconnect the fusee chain and remove the box and the spring. Care should be taken to throw no cross strain on the chain.

(iii) *Tangent Sight and Cover Lock.*—Lower the cover, putting a screwdriver across the breech casing under the gun-metal block, drive out the axis pin of the stem and remove with its piston and spring. Close the cover, press in the cover lock with the large screwdriver, remove the stop screw; the lock with its piston and spring can then be removed.

(iv) *Cover.*—Drive out the fixing pin of the cover joint pin, remove the collar and joint pin and take off the cover.

(v) *Rear Cross Piece.*—Drive out the tapered fixing pin, grasp with the left hand the left handle of the rear cross piece, slightly raise the casing and, with the mallet, strike the top edges of the casing alternately until the rear cross piece is clear of the dovetails on the casing. Lift out the trigger bar.

(vi) *Slides, Right and Left, and Check Lever.*—Pull out the slides. Drive out the fixing pin from the check lever collar, remove the collar and check lever.

(vii) *Recoiling Portion.*—Fold back the connecting rod on to the crank, turn the crank handle to a vertical position, and draw out to the rear the recoiling portion. Dis-

connect the side plates by dropping them and springing them outwards. If necessary, by taking out the fixing pin, the crank handle can be driven off with a drift and hammer, and the fusee unscrewed from the left bearing of the crank, but as a rule these parts should not be stripped.

(viii) *Foresight*.—The position of the foresight should first be carefully marked. Remove the fixing screw and foresight.

(ix) *Steam Tube and Packing Gland*.—Up-end the barrel casing so that it stands on the rear end of the breech casing. Remove the keeper screw and unscrew the steam tube. Unscrew and remove the packing gland and packing.

(x) *Breech and Barrel Casings, and Ejector Tube Spring*.—Rest the barrel casing on a table or bench, with the filling hole uppermost, and the breech casing clear of the bench; place the left hand under the breech casing and strike the top edges alternately with a mallet, and the casings will come apart. Lift the ejector tube spring with the point of the screwdriver and tap out the spring with the drift and hammer. (In converted guns remove fixing wire and unscrew fixing screws.)

Note.—The breech and barrel casings should only be separated when repairs are necessary. Care must be taken not to strike the barrel casing, and the blows should be

struck as close to the dovetailing as possible.

(xi) *Lock*.—(a) Release the lock spring, lay the lock on a bench, left side uppermost. Drive out the sear, tumbler, and lock spring axis pins. (b) Remove the keeper bracket, extractor levers, lock spring, tumbler, firing pin, and sear. (c) Drive out the trigger axis pin, extractor stop keeper pin, remove the trigger, extractor stop, and slide the extractor from the face of the lock casing. (d) Push out the gib spring cover, take out the gib spring and gib. (e) Drive out the extractor spring fixing pin, and remove the extractor spring. (In converted guns the extractor spring is riveted to the extractor.)

Note.—(e) should only be done in case of breakage.

(xii) *Feed Block*. (a) Drive out the spring fixing pin of the top and bottom levers, drive out the bottom lever and remove the top lever and slide. (b) Drive out the axis pin of the bottom pawls and remove pawls with feed block spring. (In converted guns unscrew fixing screws and remove feed block springs.) (c) Drive out the fixing pin of the band roller axis pin, remove the collar, axis pin, and band roller. (d) Remove the top pawls from the slide by pressing them outwards. The springs for the pawls, if weak or broken, are only to be removed by an armourer or qualified artificer.

(xiii) *Tangent Sight*.—(a) Remove the top

fixing screw of the graduated plate. (b) Run the slide off the stem. (c) Remove the fixing screw of the milled head, and lift the latter off the slide. (d) Remove the fixing pin, pawl, and pinion, from the slide. (e) Place the milled head, face upwards, on a bench; then with a drift, applied to the rectangular nib on the spring slide, knock the latter down flush with the face, when it can be lifted out with the pliers.

(xiv) *Rear Cross Piece*.—(a) Drive out the axis pin of the firing lever, and remove the latter with its spiral spring. (b) Drive out the axis pin of the safety catch, and lift out the latter, also the piston and spring from their seating. (c) Remove the pivot screw and shutter. (d) Unscrew, from the handles, the milled heads with their leather washers and oil brushes.

Before assembling the gun all parts should be tried in their places separately to see that they work freely.

Assembling the Gun.—Reverse all the foregoing operations with the exception that the recoiling portions must be replaced before the packing and packing gland. In order to assemble the barrel and breech casings, they will have to be turned upside down, i.e., the filling hole down, and the bottom plate of breech casing uppermost; they should be positioned by the crosshead joint pin; care must be taken that the ejector tube spring

is in position before joining the casings together. When assembling the feed block the longer of the two bottom pawls must always be placed at the front. When assembling the tangent sight, it will be found convenient to place the slide on the stem before attaching the milled head; in this position the pinion is prevented from turning with the pawl when engaging the arms of the slide spring outside the lugs on the pawl.

SPARE PARTS AND IMPLEMENTS.

A filled spare part box, containing the following, is issued with each gun:

*Bags, water and nozzle . . .	1	Pins, firing	2
Balances, spring	1	Pliers, cutting (pairs) . . .	1
Blocks, feed	1	Plugs, clearing	1
Boxes, strips and eyelets . . .	2	Punches:	
Chains, fusee	2	No. 1.	1
Corks, for plugs	2	No. 2.	1
Eyelets repairing belts oz. . .	1	No. 3.	1
Funnels	1	No. 4.	1
Gibs, Mark II.	2	Pull-throughs, double . . .	1
Hammers	1	Screwdrivers:	
Handles, crank	1	bent	1
Keys, gib, gunmetal valve . .	1	large	1
Levers, extractor:		small	1
left	1	Sears	1
right	1	Sights:	
Locks	1	fore	1
Lock, cover	1	tangent	1
Packing, asbestos, pieces:		Spanners, shifting	1
11 in. long	4	Springs:	
5 yards long	2	buffer	4
Pins:		connecting rod	2
axis, lock, spring	2	cover	4
" sear	2	cover lock	2
" trigger and tum-	6	ejector tube	2
bler	24	extractor	4
fixing axis pins	4	feed block	4
fixing extractor spring . . .	4	feed block slide	4
fixing fusee chains	2	firing lever	2

Springs:		Strikers, for pin, firing, Mark	
fusee	2	II	4
gib	2	Strips:	
lock	4	long, N.P.	25
safety catch	2	short, N.P.	25
sear	2	Tools, belt repairing	1
5 shutter	2	Triggers	1
side plate	2	Tumblers	1
tangent sight	2	Vessels, water	1
tangent sight slide	2	Wrenches, pin	1
5 trigger bar	2	Wire gauze, pieces	2

*Except for Armaments.

5 Only supplied for guns which have no firing lever spring.

Cotters and washers are integral parts of the gun, but are kept in the spare part box. They must accompany the gun on all occasions.

In addition, the following are supplied to complete the equipment:

Attachment, muzzle,	}	1 per .303-inch gun, carried in spare part box.
Mk. II (ball), .303-inch and converted		
Mk. II		

Barrels see para. 72.

Belts, ammunition see Equipment Regulations.

Cleaner, muzzle at-	}	1 per converted gun.
tachment		

Lock, skeleton, brass	}	see Equipment Regulations.
Lock, D.P. (instructional)		

Plug, cork 1 per gun.

Plug, belt, and	}	see Equipment Regulations.
Reflector, mirror		

Protector, muzzle 1 per gun.

Rod, cleaning 1 per gun.

The following reserve parts are available for issue when required, and can be fitted locally:

Box, fusee spring.	Piston, tangent sight.
Bracket, keeper.	Plate, graduated, tangent sight.
Brush, oil, with wooden holder.	Plate side, right.
Brush, oil, with milled head.	Plate side, left.
Catch, safety, double handed.	Plug, screwed.
Chain, piece, 10 links, for plugs.	Rod, connecting, Mark II.
Collar, band roller, axis pin.	Roller, band.
Collar, check lever.	Ring, split, for spring balance.
Collar, cover joint pin.	Screw, adjusting fusee spring.
Cotters, Nos. 0, 1, 2, 3, 4. Rod connecting.	Screw, fixing, feed block spring.
Cover, gib spring.	Screw, fixing, ejector tube spring.
Extractor stop.	Screw, fixing foresight.
Gland, packing.	Screw, fixing, graduated plate, upper.
Head, plug, screwed.	Screw, fixing, graduated plate, lower.
Lever, check.	Screw, fixing, milled head, tangent sight.
Lever, firing.	Screw, keeper, steam tube.
Pawl, tangent sight.	Screw, pivot, shutter.
Pin, axis, band roller.	Screws, stop, cover lock.
Pin, axis, bottom pawls.	Shutter, Mark II, for rear cross piece.
Pin, axis, top pawls.	S-hooks.
Pin, axis, firing lever.	Slide, breech casing, right.
Pin, axis, safety catch.	Slide, breech casing, left.
Pin, axis, tangent sight.	Stud, fusee spring box.
Pin, fixing, check lever.	Stud, screwed plug.
Pin, fixing, crank handle.	Tang, belt, ammunition.
Pin, fixing, pawl, tangent sight.	Tube, steam.
Pin, fixing, rear cross piece.	Trigger-bar.
Pin, fixing top and bottom levers, feed block.	Washers, Nos. 1, 2, 3, 4. Rod connecting.
Pin, joint cover.	
Pin, keeper, extractor stop.	
Pin, stop, check lever.	
Piston, cover lock.	
Piston, safety catch.	

NOTE.—Instructions for fitting these parts, where necessary, are contained in armourer's Instructions.

GENERAL INSTRUCTIONS FOR THE MAINTENANCE AND PRESERVA- TION OF GUNS.

For cleaning and oiling Maxim Guns and mountings in the hands of the troops, the following stores are allowed per annum in peace, for one gun and its mounting:

Dubbing	$\frac{1}{2}$ lb.
Flannelette, Mark II . . .	11 yards.
Old linen	3 lbs.
Mineral oil, burning . . .	$\frac{1}{2}$ pint.
Russian petroleum for lubricating	8 pints.
Spirits of turpentine . . .	1 pint.
Soap, yellow	4 bars.

The *barrels* should be examined and thoroughly *cleaned daily*, and then left with a coating of oil in the bore.

To Clean the Barrel.

Open the cover, turn the crank handle over against the buffer spring, raise the lock and let it rest upon the top of the rear cross piece. Place a piece of flannelette, about 4 inches by 2 inches, *in each eye or slot of the cleaning rod*, care being taken that the latter is surrounded with the flannelette, which should be well oiled; then insert the rod into the muzzle of the barrel, placing the movable bush on the muzzle, and pass it up and down

till the barrel is clean; replace the oiled flannelette by dry pieces, and finally pass freshly oiled pieces through, leaving the barrel well oiled. If the flannelette is tight, and is pushed through the breech, it is necessary to reverse it before pulling it back, otherwise it will jam.

To Use the Double Pull-through.

If slight rust or metallic fouling is present, place the gunmetal protector on the muzzle to keep the cord central, open the cover, remove the lock and place the crank handle in a vertical position, keeping it there by placing an empty cartridge case between the crank handle and the resistance piece. Drop the weight through the bore from the breech, pass it through the hole in the crank and the shutter hole, and having well oiled the gauze, pull it with the assistance of another man backwards and forwards until the fouling or rust is loosened; the barrel can now be cleaned with the cleaning rod and flannelette as described above. When by compression the gauze fits too loosely to clean the grooves of the barrel, its diameter can be increased by inserting under each side narrow strips of flannelette or paper. When the gauze is worn out, it should be replaced by one of the spare pieces which are issued with each double pull-through.

Cleaning after Firing Ball or Blank.

When ball ammunition has been fired, daily cleaning of the barrel is necessary for at least ten days afterwards. Subsequent cleaning must depend on the discretion of the officer in charge of the gun; in a dry climate, once a week should be sufficient, but in situations where the barrel is exposed to a moist atmosphere it may be necessary daily. The bore should at all times be left coated with oil.

When the D.P. barrel has been used for firing blank ammunition it should be thoroughly cleaned as soon as possible and left coated with oil. Subsequent weekly cleaning should suffice, but this must also depend on local conditions.

Cleaning of Mechanism.

To clean the mechanism, a mixture of *equal parts of Russian petroleum and paraffin* should be used. If any parts are clogged with dried oil, spirits of turpentine should be used to remove it. After cleaning each part, it should be thoroughly dried and slightly oiled with Russian petroleum. Very little oil should be used for this purpose, as it is apt to catch the dust and clog.

The plan of hanging the lock and moving the recoiling portion by pulling on the crank handle affords a ready means of *oiling the recoiling portion and bearing parts of the barrel,*

viz., (a) just in front of the gunmetal valve (which can be got at by removing the feed block), and (b) at the muzzle end, in front of the packing gland. (In converted guns, insert the oil can through one of the drain holes of the muzzle attachment).

Hanging the Lock.

The lock is hung as follows: Turn the crank handle on to the buffer spring; then, with the extractor in the lowest position, raise the lock slightly till clear of its guides; allow the handle to come back a little, and the lock to rest on the top of the guide; it will now be found to be fixed.

Treatment in Frosty Weather.

In frosty weather, when water is kept in the barrel casing, a blanket or some other thick covering should be kept wrapped round the barrel casing to prevent the water freezing. The working parts of the gun should only be slightly oiled with a lightly-oiled rag. In climates where the temperature is likely to fall much below freezing point, not more than about 5 pints of water should be put into the barrel casing (20 per cent of glycerine mixed with the water will prevent it from freezing so quickly).

When Stowed Away.

When guns are returned to store, packed for transmission, or stowed away in any place

where they cannot be readily examined, the barrels and unpainted parts should be coated with "Composition, preserving, arms." The mixture is to be made hot, and a piece of flannel dipped in it, with which the exterior parts will be dabbed. To coat the inside of the barrels, draw a bunch of lamp cotton, well saturated with the mixture, through from both ends; the lamp cotton is to be attached to a piece of twisted copper wire.

HISTORY SHEET.

A memorandum of examination or history sheet accompanies each gun when issued. It will be carefully preserved and will be handed over with the gun to which it belongs whenever the gun is transferred from the charge of one officer to that of another, particulars being duly recorded. An immediate record will be made in the sheet of any accident which may happen to the gun, and of the result of each official examination it may undergo. *On every occasion on which ball ammunition is fired, the number of rounds fired will be shown, the number of the barrel being inserted in the column of remarks.*

ISSUE OF BARRELS.

A new or part-worn, but serviceable, barrel is issued as part of each gun. This barrel is only to be used for firing ball ammunition.

An old barrel, marked D.P., is also issued,

to be used only for firing blank ammunition and for drill purposes. On mobilization these two barrels are to be returned to store. In addition, two new barrels (armament, one) are issued with each gun, and are to be kept in store, and only taken into use on mobilization, one in the gun and one spare. New barrels in store are distinguished by a band of white paint round the centre.

POINTS TO BE ATTENDED TO BEFORE, DURING, AND AFTER FIRING.

It is most important that every gunner should gain familiarity with the points outlined below, and that every firer should carry them out for himself on the range.

The smooth working of the gun almost entirely depends upon the observance of these points, and instructors cannot emphasize them too much.

I. POINTS TO BE ATTENDED TO BEFORE LEAVING CAMP OR BARRACKS FOR FIRING.

(a) Oil Up.

The surfaces on which all movable parts work should be thoroughly well oiled with petroleum, especially the following:

Bearing parts of the barrel, and all re-coiling portions.

The lock guides on the side plates, also

the working parts of the lock itself, especially the levers and extractor.

Face of the feed block and the edges of the steel guides inside the feed block.

Bearings of the crank, cover springs and gun-metal block.

(b) Test Friction of Recoiling Portion.

In order to see that the recoiling portion works freely, cock the lock, remove the fusee spring box and spring, turn the crank handle upwards, take hold of it with the right hand and the fusee with the left, move the recoiling portion, with the gun horizontal, backwards and forwards, to see that it works freely, and also that the barrel goes close home forward. The weight necessary to move the recoiling portion should not exceed 4 lbs. (converted guns 7 lbs.), measured by placing the loop of the spring balance over the knob of the crank handle, and pulling to the rear when the handle is slightly above the horizontal.

(c) Weigh Fusee Spring.

Replace the fusee spring and weigh it with the spring balance as follows: Cock the lock, place the loop of the spring balance over the knob of the crank handle, and pull the balance vertically upwards, resting the wrist on the breech casing; (*See Plate V.*) the reading indicated when the crank handle commences to move will be the weight of the

fusee spring. This weight should be between 5 and 7 lbs. (for converted Mk I guns, between 10 and 12 lbs.; Mk II, between 5 and 7 lbs.), and care should be taken, when weighing, to see that the lock works quite freely, and that there are no cartridges or empty cases in the extractor. If the spring is over, or not up to, weight, remove the fusee spring box and adjust by means of the adjusting screw at the end; generally 6 turns of the screw make a difference of about 1 lb. Turning the screw in the direction of the hands of a watch increases the weight, and vice versa. The tension of the fusee spring should always be kept as high as possible, consistent with maintaining the normal rate of fire of 450 rounds per minute. (With Mark VII .303-inch ammunition, the normal rate of fire is 500 rounds per minute.)

(d) Examine Barrel, etc.

Examine the barrel, to see that the bore is clear; also the tripod, clearing plug, lock, and other important parts.

(e) See to Water Supply.

See that the barrel casing is filled with water. To fill the casing, remove the screwed plug at the breech end, also the cork plug, pour in the water, and replace the plugs.

(f) Oil in Handles, etc.

Ensure that the handles have been filled with oil; ascertain that the spare lock and feed block, and also the clearing plug and cleaning rod, are with the gun.

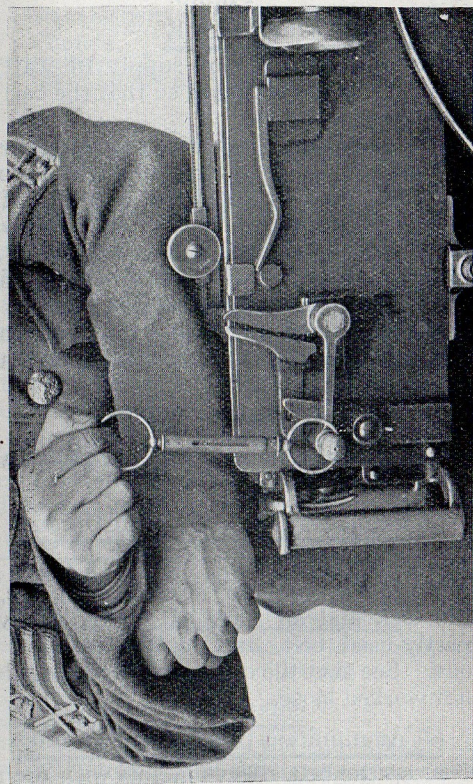
(g) Examine Belts.

Examine the belts, inspect the brass strips, see that the belts are correctly filled and packed carefully in the ammunition belt boxes. Keep the belts dry if possible; should they get wet, lay them out to dry. New or stiff belts should be well plugged.

(h) If Water Frozen Use Muzzle Attachment.

Should the water in the barrel casing become frozen solid, on the gun being fired the barrel will probably not recoil far enough to work the gun, and will remain back. To remedy this, put on the muzzle attachment for ball firing, leaving the fusee spring at its normal weight. Turn the crank handle on to the buffer spring, then bring it back to a vertical position and force the barrel to the front, pulling the belt if necessary; let the crank handle return to the check lever, and fire the gun. This should be repeated until the barrel recoils correctly. When the gun begins to work correctly, the muzzle attachment may be taken off.

Plate V.
METHOD OF TESTING THE WEIGHT OF THE FUSEE SPRING



Care in weighing the fusee spring and testing the friction of the recoiling portion requires emphasizing. Note the support given to the right arm.

POINTS TO BE ATTENDED TO DURING
FIRING.(a) Watch Water Supply.

See that a sufficient supply of water is kept in the barrel casing, so that the barrel is never uncovered.

The water in the barrel casing begins to boil when the gun has fired about 600 rounds with the greatest rapidity; after this, if the firing is continued, the amount of water evaporated is about $1\frac{1}{2}$ pints for each 1,000 rounds. When the barrel casing is filled with water about 2,000 rounds may be discharged at short intervals without replenishing, but this depends upon the rapidity with which the gun is fired.

(b) Belt Not Pulled.

The belt is on no account to be pulled when the gun is firing.

(c) Temporary Cessation: Oil Up and change belt.

During a temporary cessation of fire, oil the lock and all frictional parts, remove a partly-used belt, and replace it by a full one. See that the clamps of tripod legs have not worked loose.

(d) Ammunition Box Up and In Line.

Keep the belt always in line with the feed block and the ammunition box, if possible, up to, but not above, the cross-head joint pin.

(e) Belts Re-filled.

See that the belts are re-filled without delay.

(f) Clamps.

See that clamps of tripod legs do not work loose.

POINTS TO BE ATTENDED TO AFTER
FIRING.(a) Unload and Clear Ejector Tube.

See that the gun is unloaded and that no cartridges are left in the ejector tube. To clear the ejector tube, place an empty cartridge case in the lowest part of the extractor, replace the lock and let it go forward, holding the crank handle, until the empty case in the ejector tube is pushed out.

(b) Oil Bore.

See that the chamber and bore are well oiled *immediately* after firing.

(c) Release Lock Spring.

See that the lock spring is released.

(d) Gather Live Rounds from Cases.

See that any live cartridges that happen to be among the cases are collected.

(e) Clamp up Before Moving.

See that before moving, the gun is securely fixed by clamping the traversing gear, and that all pins are secure in their holes, so as to prevent damage to pins or cords. (In

carriage mountings, the elevating gear will also be clamped.)

(f) Thorough Cleaning in Barracks.

On return to barracks the gun and the barrel should be thoroughly cleaned as soon as possible, and the interior left coated with oil; the lock should be taken out and thoroughly examined to ensure that there has been no breakage. It will not be necessary to strip the lock for this purpose. Ammunition belts should be examined and if wet or damp should be hung up to dry.

ABBREVIATED MEMORY TABLE OF			
POINTS TO BE ATTENDED TO BEFORE, DURING, AND AFTER FIRING.			
	<i>Before Firing.</i>	<i>During Firing.</i>	<i>After Firing.</i>
1	Oil up.	Watch Water Supply.	Unload and clear ejector tube.
2	Test Recoiling Portion.	Belt not pulled.	Oil Bore.
3	Weigh Fusee Spring.	Temporary Cessation. Oil up and change belt.	Release Lock Spring.
4	Examine barrel, etc.	Ammunition box up and in line.	Gather live rounds from cases.
5	See to Water Supply.	Belts refilled.	Clamp up before moving.
6	Oil in handles, etc.	See clamps of tripod legs not loose.	Thorough cleaning in Barracks.
7	Examine belts.		
8	Action when water is Frozen.		

PRECAUTIONARY MEASURES AND RANGE DISCIPLINE.

If carelessly handled, the machine gun is a dangerous weapon, but by careful training and constant attention to certain precautionary measures, reasonable care becomes habitual, and the risk of accidents is minimized. The following are the principal points and these should be attended to, not only when firing service ammunition, but also at drill with dummies:

(i) Before opening the cover, perform the unloading motions. This must always be carried out correctly without slurring, and each motion must be carefully and distinctly performed.

(ii) As soon as the order, "Unload," is given, and the unloading motions have been performed (see page 109), (a) the cover should be opened, the lock raised and turned backwards on to the rear cross piece; (b) if firing is to be resumed without change of position, withdraw the belt until the uppermost cartridge or dummy is flush with the edge of the ammunition box.

(iii) When a gun is in action, no man should be allowed in front of the bracket head until the gun is reported clear, after the order to unload has been given.

(iv) When range or field practices are being carried out, the gun should invariably be reported clear after unloading, including clearing of ejector tube, and before anybody is allowed to go forward to examine the target, or for any other reason.

STOPPAGES.

STOPPAGES IN THE AUTOMATIC ACTION OF
THE GUN DURING FIRING.

1. Stoppages in the automatic action of the gun during firing may be classed under two main headings:

(i) Temporary, which are due to—

(a) Failure of some part of the gun, of which a duplicate is carried, and which therefore can be easily and quickly replaced, or faulty ammunition.

(b) Some cause which can generally be avoided by a high standard of training and a thorough knowledge of their gun by the detachment. These are generally due to neglect on the part of the detachment of some of the points to be observed before, during, and after firing.

(ii) *Prolonged*, which are due to failures of some part of the gun which cannot, as a rule, be put right by the detachment under fire or without skilled assistance. These necessarily put the gun out of action for a more or less prolonged period.

2. On the knowledge and training of the detachment depends the rapidity with which "temporary" stoppages can be overcome, but it is of first importance that their instruction should be with a view to making them instinctively perform the "immediate

action" when the gun stops, before they attempt to fully investigate the cause of stoppage.

3. Prolonged stoppages require skilled assistance, as a rule, before they can be overcome, but a knowledge of their causes and remedies is none the less essential before the detachment can be considered thoroughly efficient.

4. The position of the crank handle should be at once observed if a gun stops firing. This affords a ready indication of the cause of stoppage.

5. The following table sets forth in detail the various causes of temporary stoppage, together with the remedy for each. In the second column will be found the "immediate action" referred to above.

In addition to the instructions conveyed in the table the following points should be observed:

(i) If, when the cover is opened to investigate the cause of stoppage, it is seen that the extractor is not quite up, no attempt should be made to raise it. On the contrary, it should be first pushed down before the crank handle is turned over to the front, as by this means all risk of firing a cartridge accidentally is avoided.

(See Plate VI.)

(ii) When a temporary stoppage necessitates the employment of the spare lock, feed block, etc., the part which has been

removed should be repaired as soon as possible, so as to make it again available as a reserve.

(iii) Should it ever be necessary to release the lock spring with the lock out of the gun, this should be done with the extractor fully up, and the firing pin hole opposite the firing pin.

(iv) Belt and dummies will be invariably used for instruction in stoppages.

The instructor should emphasize the necessity for ensuring that the gun is correctly laid after remedying a stoppage and before re-opening fire. This should be frequently checked at drill to render it habitual.

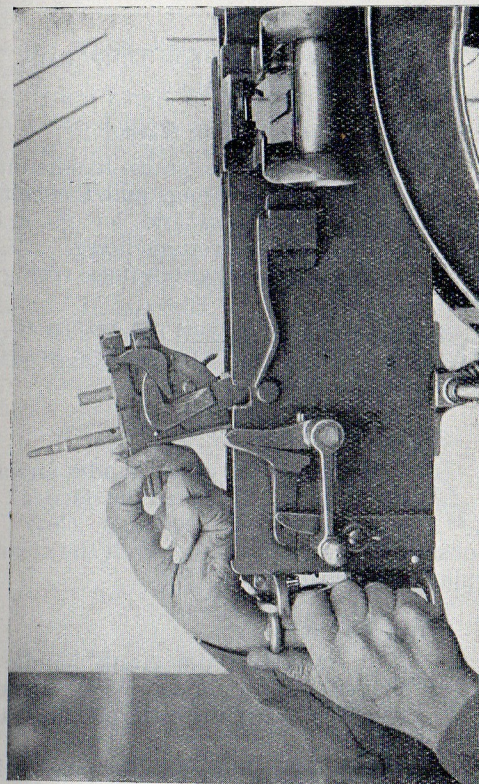
In teaching "stoppages" there are two distinct stages:

1st Stage.—Teaching men to instinctively perform the "Immediate Action."

2nd Stage.—Teaching the probable cause and detailed remedy.

The second stage should not be touched upon until the gunner can instantly perform the correct immediate action for all stoppages.

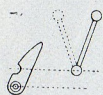
PLATE VI.
METHOD OF HANDLING THE LOCK WHEN CLEARING THE EXTRACTOR.



Always raise the lock from the gun by means of the upper stop. When clearing the extractor the lock should be held in the left hand, thumb between upper stop and top of extractor, the latter being pulled up towards it by the fingers. It will be found, at training, that there are good reasons for this method of holding the lock.

IMMEDIATE ACTION FOR TEMPORARY STOPPAGES.

First Position of Crank Handle.



1. Turn the crank handle on to the buffer spring, pull the belt to the *left front* and let go crank handle, and resume firing.
2. If failure recurs, lighten fusee spring by three turns.
3. If crank handle does not return to the check lever but reverts to the first position, change the lock and reload.

Second Position.



Force the crank handle forward, open cover, clear the face of extractor, if necessary clear the obstruction in the chamber with the clearing plug, and reload.

Third Position.



1. Strike the crank handle on the check lever by a glancing blow with the palm of the hand; if this fails:
2. Slightly raise crank handle, pull the belt to the left front, and let go the crank handle, striking it down again on the check lever.
3. If (2) fails, examine position of

recoiling portion (at crank bearings) and feel slide.

4. If home and slide free, investigate cause.

5. If not home, or if home, slide jammed, remove feed block and take spare one and fresh belt into use.

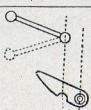
Fourth Position.



1. Turn the crank handle on to the buffer spring, pull the belt to the left front, and let go crank handle. If this fails:
2. Place crank handle on to buffer spring *twice*, change the lock, and reload.

TEMPORARY STOPPAGES WITH DETAILED REMEDY.

FIRST POSITION OF CRANK HANDLE.

Position of Crank Handle and its Indication.	Immediate Action.	Position of Barrel.	Probable Cause.	Remedy in Detail.	Method of Preparation for Instructional Purposes.
<p>First:</p>  <p>The lock is unable to come back for enough to allow the extractor to drop, or the extractor having dropped, the lock is still back the length of a cartridge.</p> <p>Indication. The lock is unable to come back for enough to allow the extractor to drop, or the extractor having dropped, the lock is still back the length of a cartridge.</p>	<p>Turn the crank handle on to the buffer spring. Pull the belt to the left front and let go crank handle.</p> <p>(1) If it returns to the check lever, resume firing. If failure recurs, lighten fusee spring by three turns.</p> <p>Note.—If stoppages of this class occur frequently on service, the quickest way of overcoming them is to take the gunning attachment into use until a suitable opportunity offers for detailed investigation.</p>	Home	<p>(1) If, on opening the cover, the extractor is found not to have dropped: (a) Too heavy fusee spring. (b) Excessive friction. (c) Insufficient energy of recoil due to deteriorated ammunition or worn barrel.</p>	<p>(a) Weigh fusee spring and adjust if necessary. (b) See if working parts are well oiled and free from grit. (c) Take muzzle attachment into use. This should only be done when (a) and (b) have failed. The barrel should be examined at the first opportunity, and if much worn in the lead should be changed.</p>	<p>(1) Raise the lock and place an empty case over firing-pin hole, and a dummy cartridge between the projections of the gfb. Pull a cartridge into position in the feed block, replace lock with the horns of the extractor on the top of the solid cans.</p> <p>When actually firing this can be simulated by increasing the weight of the fusee spring.</p>


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NOTE.—In the above cases the energy of recoil is insufficient to overcome the strength of the fusee spring acting to either the latter being too great on the energy having become lessened either by excessive friction or owing to insufficient pressure exerted on a charge. The lock is therefore arrested before it has been drawn back far enough to allow the extractor to clear the solid cans and to drop. The cartridge in the lock which has been drawn from the feed block, by bearing against the one which is being, or has been, fed up in the feed block, prevents the lock from going forward again.

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<p>Home (or nearly so).</p>	<p>(d) Tight pockets in belt causing extra work to be done in withdrawing the cartridge. This, not being drawn completely clear of the feed block, will arrest the movement of the slide, and thus the action of the recoiling portion.</p>	<p>(d) Immediate action will cure this, but should it occur frequently owing to a damp belt, a dry belt should be substituted.</p>	<p>(2) If the extractor is found to have dropped: Weak or broken gfb having partly slipped down over the lower projection of the gfb will, instead of entering the chamber, strike below it, thus holding back the lock.</p>	<p>(2) Raise the lock, place an empty case over firing-pin hole, and push a dummy cartridge about midway down the lower projection of the gfb, and replace the lock.</p>
<p>(2) If crank handle does not return to the check lever but reverts to the first position, change the lock and reload.</p>	<p>Home</p>	<p>(2) Immediate action will cure this.</p>		

SECOND POSITION OF CRANK HANDLE.

Position of Crank Handle and its Indication.	Force the crank handle forward, open cover, clear the face of extractor, if necessary clear the obstruction in the chamber, as detailed in column 5, and reload.	Immediate Action.	Position of Barrel.	Home	(a) Damaged cartridge. The cartridge is unable to enter the chamber completely although it has commenced to do so.	Probable Cause.	Remedy in Detail.	Method of Preparation for Instructional Purposes.
SECOND:  Indication: The lock is unable to go forward after recoil and is held back about 1/4 in.					(b) Broken or separated case; the front portion of which causes an obstruction and prevents the next cartridge from going into the chamber.		(b) (i.) The front portion of the broken case may come out on the live cartridge in the lock. Immediate action and reloading will cure this. (ii.) The front portion of the broken case may remain in the chamber. Lay the lock back on	(a) Bulge a dummy cartridge and place it on the extractor between the gib and projections of the pin hole. A cartridge should be pulled into position in the feed block. Replace lock. For range purposes: Place a bulged cartridge in the belt.
								(b) Cut an empty case in two and place the front portion in the chamber and the rimmed portion over the firing-pin hole, also a dummy cartridge between the projections of the gib, then allow the lock to go forward.

NOTE.—If a succession of separated cases occur the cause may be due to want of support by the lock.


*Remedy:—
Lengthen the connecting
rod.*

THE NEXT most important step is to ensure that the clearing plug is seated in the chamber and insert into the lock, and replace the crank handle, pushing the plug well home by means of the lock; this will tighten the grip of the plug inside the case by pushing the centre pin forward. Then, keeping a firm pressure on the crank handle, give the clearing plug a rocking motion, withdraw the lock draw back the handle of the clearing plug to give primary extraction; withdraw the clearing plug, thereby removing the obstruction.

(c) Weak or broken extractor spring. The empty case not being correctly supported in the lock does not lead into the ejector tube, thereby holding back the lock. This is a very unlikely occurrence.

For range purposes a cartridge may be filed about one inch from the base and inserted in the belt.

THIRD POSITION OF CRANK HANDLE.

Position of Crank Handle and its Indication.	Immediate Action.	Position of Barrel.	Probable Cause.	Remedy in Detail.	Method of Preparation for Instructional Purposes.
<p>THIRD:</p>  <p><i>Indication:</i> If the barrel is home, that the extractor is unable to rise to its highest position, although the lock is almost home. If the barrel is not</p>	<p>Strike the crank handle on to check lever by a glancing blow with the palm of the hand. If this fails, slightly raise the crank handle, pull the belt to the left front, and let go the crank handle, striking it down on to check lever. If this fails, examine portion of recoiling portion and feed slide.</p> <p>(1) If home and slide free, investigate cause.</p>	Home	<p>(1) Some cause which prevents the extractor from rising and gripping the cartridge in the feed block, due to:</p>		

<p>home, that there has been a "fault in feed."</p> <p>If the feed block slide is jammed, a fault in feed is indicated, irrespective of position of barrel.</p>	<p>(a) Slight fault in feed; a cartridge is fed up slightly cross-ways. (b) Too light fusee spring, or (c) Excessive friction.</p> <p><i>NOTE.—In these cases the fusee spring is unable, either owing to being too light or because of excessive friction, to complete the forward motion of the lock and the raising of the extractor.</i></p> <p>(d) Damaged cartridge rim. The extractor is unable to grip the cartridge in the feed block. (e) Damaged cartridge grooves in extractor producing the same effect. (f) Broken gib.</p>	<p>(a) Immediate action will cure. (b) Weigh and if necessary adjust fusee spring. (c) See if working parts are well oiled and free from grit.</p>	<p>(a) Pull the belt slightly to the left rear and so feed the cartridge slightly cross-ways; then allow the lock to go slowly forward and the extractor will be prevented from rising to its highest point.</p> <p>(d) Place a dummy cartridge with a badly damaged rim in the belt. Pass it through the feed block and allow the lock to go slowly forward.</p>		
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THIRD POSITION OF CRANK HANDLE.—(Continued.)

Position of Crank Handle and its Indication.	Immediate Action.	Position of Barrel.	Probable Cause.	Remedy in Detail.	Method of Preparation for Instructional Purposes.
	(2) If not home, or if home, slide jammed, remove feed block and take spare one and fresh belt into use.	Not Home (or Home)	(2) Fault in feed, due to: (a) Badly filled belt or a belt with worn or loose pockets. The cartridges projecting unevenly from the belt prevent it entering or passing freely through the feed block.	When the feed block has been removed from the gun it should be cleared as follows: Insert the brass tag at the end of the belt into the feed block from right to left so that the tag lifts the top pawls. Depress the bottom pawls at the same time keeping a pull on the belt with the thumb of the left hand. The belt can then be drawn out. This can be done with the feed block in the gun by "hanging" the lock. When the slide is moved to the right on drawing back the recoiling portion, placing an empty case between the crank handle and resistance piece, and proceed as above.	(2) Place five dummies in a belt with the bullets of the 3rd and 5th projecting beyond the long brass strip, pull the 4th slightly out; pull the belt through as far as it will go. Hang the lock and pull the crank handle to the rear and let go, raise the lock and place a dummy between the projections of the gib, and an empty case over the firing pin hole. Lower lock, shut cover, and let go crank handle, (c) Fill a belt badly.

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	(2) Damaged belt: One of the long strips may be bent, producing the same result as (a). (c) Belt box not being in line with feed block: The belt does not lead up correctly to the feed block and becomes jammed outside it.		(b) Bend a long brass strip. (c) Place belt box at an angle.
<p><i>NOTE.—The effect of a fault in feed is that the top pawls of the feed block slide being engaged behind a cartridge in the belt are held fast when some obstruction, such as above, prevents the belt from passing freely through the feed block. The slide being connected by the top and bottom levers to the recoiling portion, the latter is arrested and prevented from going home. The distance it is held back depends upon the point at which the obstruction asserts itself. The crank handle may therefore stop in other positions, but the throw is the most usual.</i></p>			

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Position of Crank Handle and its Indication.	Immediate Action.	Position of Barrel.	Probable Cause.	Remedy in Detail.	Method of Preparation for Instructional Purposes.
<p>FOURTH:</p>  <p>Indication: That there has been no explosion, or if any, that there has been little or no recoil, the lock remaining in its forward position.</p>	<p>Turn the crank handle on to the buffer spring, pull the belt to the left front, and let go crank handle. If this fails, place crank handle on to buffer spring twice, change the lock, and reload.</p>	Home	<p>(a) Defective ammunition. (b) Broken or damaged firing pin. (c) Weak or broken lock spring. (d) Worn or broken side or extractor levers: The lock will go forward correctly, but the extractor will not rise.</p>	<p>(a) Immediate action will cure. (b) Change the lock. (c) Change the lock. (d) Change the lock.</p>	<p>On range:— (a) Place a dummy cartridge in belt. (b) (c) (d) The effect of these will be simulated by placing two dummy cartridges in succession in belt.</p>

PROLONGED STOPPAGES.

The causes of *prolonged* stoppages are so varied that they cannot be set out in detail. The following are amongst the most probable, and the detachment should be thoroughly trained to recognize them and to apply such remedy as lies in their power pending a permanent repair:

1. *Broken cover springs*.—The extractor may not drop when the lock is drawn back, and the gun will stop with the crank handle in the first position. This may possibly be overcome by liberal oiling of the lock, but in any case single shots can be fired by holding the crank handle forward until the extractor drops by its own weight.

2. *Broken ejector tube spring*, causing either a block in the ejector tube or an accumulation of empty cases in the breech casing. It may be found possible to keep the gun in action if care is taken to prevent the latter.

3. *Cotter working out*, thus causing the screwed head and connecting rod to become separated. To remedy, proceed as follows:

(a) Take out the cotter. (This will be found either on the crank or at the bottom of the breech casing.)

(b) Press down the screwed head with the large screwdriver to cock the lock.

(c) Turn the screwdriver edgeways, and

insert it behind the horns of the extractor and between the face of barrel and front of the lock flange, and force the lock to the rear.

(d) Turn crank handle on to the buffer spring, press down the extractor, raise the lock, and remove the live cartridge; then lift out the lock.

4. *Damaged parts of the lock, no spare being available.*—The gun will fire without the sear, or if the bents of the sear or firing pin are badly worn or broken off, but only single shots, and only by pressing and releasing the firing lever quickly. The gun will also fire if the nose of the trigger and bent of the tumbler are badly worn or broken off, but only rapid firing. In this case the gun will fire the instant the crank handle reaches the check lever, although the firing lever has not been pressed. If this occurs during firing, to stop the gun the filled end of belt should be thrown over the breech casing to the left.

If the sear and firing pin action only is in good order, the gun can be worked as follows:

(a) Group the cartridges in the belt, say 20 or 30 rounds in each group.

(b) Lay the gun before commencing to load, place crank handle on buffer spring, pull belt to left, and let handle go; repeat, but before allowing the handle to reach

check lever, and the gun to fire, grip rear cross piece with left hand to control gun in the ordinary way.

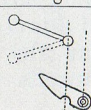













When firing has been stopped by throwing the belt over the breech casing as described above, hold the crank handle with the right hand, open the cover, press down the horns of the extractor, draw the lock back and, if there is a live cartridge on the face of the extractor, remove the feed block and belt, close the cover and allow the lock to fly forward, when the live cartridge which is on the face of the extractor will be fired automatically. The lock can then be changed with safety. On no account should the lock be allowed to fly forward until the feed block has been removed and the cover shut.

If, on drawing the lock back, it is found that there is no live cartridge on its face, the lock may be changed at once, and the necessity for removing the feed block and the subsequent precautions will not arise.

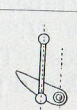






5. *Gun-metal valve working loose.* This will prevent the barrel from going home. It may be temporarily remedied by tapping it round with a hammer and punch, but it should be tightened at the earliest opportunity with the gib key, the barrel being removed.

MEMORY TABLE OF STOPPAGES IN ABBREVIATED FORM.

TEMPORARY STOPPAGES.

Position of Crank handle.	Position of barrel.	Immediate Action.	Probable Cause.	Remedy in Detail.
	Home	1. Crank handle on buffer spring and pull belt left front. Let go.	1. Too heavy fusee spring.	1. Weigh and adjust if necessary. Oil up and remove grit.
	or Nearly Home.	2. Lighten fusee spring three turns.	2. Excessive friction.	Take muzzle attachment into use, or change barrel.
	Home.	3. Change lock and reload.	3. Deteriorated ammunition or worn barrel.	Substitute dry belt.
	Home.	Force crank handle forward, open cover, clear obstruction, and reload.	4. Tight pockets.	Change lock as in "Immediate Action."
	Home.	1. Strike crank handle down.	5. Weak or broken gib spring.	Immediate action.
	"	2. Slightly raise crank handle, pull belt, and strike handle down.	1. Damaged cartridge.	Clearing plug, or new washer. Change lock.
	"	3. Examine position of recoiling portion.	2. Broken or separated case.	Immediate action.
	"		3. Weak or broken extractor spring.	Weigh and adjust if necessary. Oil up and remove grit.
	"		1. Slight cross feed	Remove cartridge from feed block.
	"		2. Light fusee spring.	"
	"		3. Excessive friction.	"
	"		4. Damaged cartridge rim.	"
	"		5. Damaged cartridge grooves.	"
	"		6. Broken gib.	"

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	Not Home or Home.	4. If home, slide free, investigate.	1. Badly filled belt or loose pockets.	Remove feed block and use tag of belt to clear it. (This may be done in or out of gun.)
	Home.	5. If not home, slide jammed, remove feed block.	2. Damaged belt.	Change lock.
	Home.	1. Crank handle on buffer spring, pull belt left front. Let go.	3. Box not in line with feed block.	"
	"	2. Crank handle twice forward, change lock and reload.	1. Defective ammunition.	Immediate action.
	"		2. Broken or burred firing pin.	"
	"		3. " " weak lock spring.	"
	"		4. " " side or extractor levers.	"

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PROLONGED STOPPAGES.

1. Broken cover springs Liberal oiling or single shots.
2. " ejector tube spring. Prevent accumulation.
3. Cotter pin working out Use screwdriver, cock lock, etc.
4. Damaged parts of lock (no spare available) Throw belt over—single shots, or groups.
5. Gun-metal valve loose Tap round.

EXAMINATION.

The following are the principal points to be observed in the examination of Maxim guns without issuing gauges:

Recoiling portion. See this moves freely. Pull not to exceed 4 lbs.

Foresight. See that the barleycorn is in good condition.

Tangent sight. See that the top edge and V on leaf are in good condition, and that the slide works correctly.

Crank handle. The crank should bear against the stops. To try this, remove lock and place a piece of thin paper between crank and stop. If the crank fails to nip the paper the crank handle is probably bent, and bearing on the check lever or against the resistance piece.

Safety catch. See the spring and catch act automatically when the firing lever is released.

Firing lever. Test the firing lever by seeing that the trigger bar does not release the trigger before the safety catch is clear, and also see that the trigger is released before the stop on the lever bears against the stop on the rear cross piece.

Ejector Tube. See the spring grips cartridge case; it should not take more than $2\frac{1}{4}$ to 4 lbs. to push it out of the tube.

Connecting Rod, Mark II. See that the spring cotter is in its place. Test the length of rod by raising the lock and putting one of

the special dummy cartridges, issued to Armourers, into the extractor over the firing pin hole; turn the crank handle on to the buffer spring, hold the extractor up against the top stop and let the crank handle come back slowly on to the check lever; if the rod is the correct length, the crank handle will require a slight pressure of the hand to force it on to the check lever.

Steam tube. See that outer tube moves freely on inner tube when the gun is elevated and depressed.

Barrel. Condition of rifling, lead and coppering.

Lock. Test extractor and side levers by bringing the crank handle gently on to the check lever. If levers are correct, the extractor will be right up.

Test the bents of sear and firing pin. To do this, turn crank handle on to buffer spring, lift up safety catch, and press firing lever forward and keep it there. Then bring crank handle gently down on to check lever. The extractor should be well up to the top position before the firing pin is released. Examine the face of extractor for burrs and flaws at gaps and firing pin hole. Try grooves with dummy cartridges to see that they are not damaged and that the cartridges pass freely down; also try depth of gib recess with dummy cartridge (inspection dummies must be used for this purpose) to see gib holds cartridge horizontally. See that the bents

of the trigger and tumbler are not too much worn. See that the point and bent of the firing pin are in good condition.

A broken firing pin can be recognized without stripping the lock by releasing the lock-spring with the extractor up. If correct, the firing pin will then protrude from the firing pin hole, and can be withdrawn by depressing the tail of the tumbler. If broken, it will remain protruding.

General. See that all pins and fixing pins are correct.

REPAIRS AND ADJUSTMENTS.

To renew the packing at the breech end of the barrel. Should the gun leak at the breech, empty the barrel casing, remove the lock, feed block, and fusee spring box, drive out the taper pin from the rear cross piece. Drive out the split pin from the check lever, take off the collar and lever. Draw out the slides, right and left. Turn the crank handle upright and draw out the recoiling portion. *Wind a strand of asbestos (part of a 5 yards' piece) in the cannellure of the barrel, pressing it together with a thin piece of wood, or the point of a turnscrew or knife, until the cannellure is full;* then oil the asbestos and replace the recoiling portion and slides.

Replace the check lever, etc., fusee spring box, feed block, and lock.

To renew the packing at the muzzle end of the

barrel. Should the gun leak at the muzzle, stand the gun on the rear cross piece, unscrew the packing gland and repack, or, if necessary, replace the asbestos, having first oiled it, by winding it loosely round the barrel, and whilst winding push it in with punch No. 2, a piece of wood, or any blunt-ended instrument which will fit; screw on the packing gland as tightly as can be done by hand, return the gun to a horizontal position, fix the lock, and work the recoiling portion backwards and forwards to ensure that it moves freely. If the packing is found to press too hard on the barrel, the gland should be removed and one or two strands taken out of the asbestos.

INSTRUCTIONS FOR FITTING CONNECTING RODS, MARK II, AND WASHERS IN GUNS.

(i) Strip the gun and remove the side plates and crank. Then drive out the fixing pin of crank pin (from under side of crank), drive out the crank pin and remove the connecting rod.

Fit on the adjustable connecting rod and replace the crank and fixing pins, care being taken, in fitting on the connecting rod, that the slot for the connecting rod spring is on the left. This is also to be attended to when fitting on the various washers.

In the .303-inch gun, see that the locks turn to the proper position in the connecting rod.

If the faces do not come properly together, ease away the rounded end of the stem of the threaded portion of the screwed head until they turn up correctly. In peace this should only be done by an armourer.

N.B.—The rods are specially marked for .303-inch or .303-inch converted guns. Care must, therefore, be taken, when fitting them, that they are placed in the class of gun for which they are marked.

(ii) After fitting the connecting rod, the gun and spare locks should both be tried in the gun before the fusee spring is replaced to see that, with one of the special armourer's dummy cartridges held in the extractor over the firing pin hole and placed in the chamber, a gentle pressure of the hand is required to force the crank handle on to the check lever when the crank handle is allowed to come back slowly.

If no pressure is required, a washer should be fitted in the following manner: First put on the thinnest washer and again try the gun. If one lock requires more pressure on the crank handle than the other, that lock should be taken into use as the gun lock and the other kept as a spare.

(iii) Four washers, each with its own cotter, are provided, marked respectively 1, 2, 3 and 4; No. 1 being the thinnest.

When necessary they can be fitted as follows, without stripping the gun:

Turn the crank handle on to the buffer

spring, raise the lock and allow it to rest on the rear cross piece. Drive down the cotter, raise the lock to an upright position, pull out the cotter with the pliers, and take off the lock with the front part of the connecting rod attached. Now place the washer required over the stud on the boss; then rejoin the connecting rod. Insert the cotter of the same number as the washer used (from the top side), allow the lock to rest on the feed block, and drive the cotter to its place.

(iv) The washers are of the following thicknesses: No. 1 .0025-inch, No. 2 .005-inch, No. 3 .01-inch, No. 4 .02-inch, and, if necessary, any combination of them may be used; but the cotter will probably require to be slightly reduced on the edge in order to make it fit properly. When a combination of washers is used, the cotter belonging to the thickest washer of the combination should be employed.

INSTRUCTIONS FOR THE USE OF THE TOOL FOR REPAIRING BELTS.

Remove the damaged strips and eyelets. If a long strip requires fitting, first join the two portions as follows: Place an eyelet in the hole of the dished end. Insert the punch of the tool into the unopened end of the eyelet, the opened end to rest upon the die, and gently press the handles together. Then put the punch in the other end of the eyelet

and press the handles; then, keeping the belt horizontal, move the handles of the tool backwards and forwards in a circular direction with the punch of the tool as the centre, so as to shape the head of the eyelet nicely.

Put the strips into position on the belt, insert the eyelets, and repeat the above operation.

Short strips are fitted in a similar manner except that they do not require joining at one end previous to placing them upon the belt.

Care must be taken to press the eyelets as far through the strips as possible before using the tool in order to form a good head.

INSTRUCTIONS FOR FITTING SPARE COVER LOCK.

See that the new "lock, cover" works freely on the cover and in the socket.

The rear edge of the cover may require rounding (to fit the rounded edge of the lock) and the screw slot lengthening to allow the lock to clear the rear cross piece when the cover is forced down.

See that the lock engages the rear cross piece when the cover beds hard on the top of the breech casing.

Where necessary, "ease," or file away, the lock to make it fit.

After fitting, the cover lock should be fire-blackened.

REPLACEMENT OF DEFECTIVE PARTS OF THE LOCK.

When components belonging to the lock become defective, they may be replaced, from the spare parts, without fully stripping the lock, proceeding as follows:

1. *Firing Pin.*

Release the lock spring and remove:

- (a) Lock spring axis pin.
- (b) Keeper bracket.
- (c) Lock spring and extractor levers.
- (d) Tumbler axis pin and tumbler.
- (e) Lift sear and remove firing pin.

2. *Trigger, lock spring or extractor levers.*

Release lock spring and remove:

- (a) Lock spring axis pin.
- (b) Keeper bracket.
- (c) Lock spring and extractor levers.
- (d) Trigger axis pin and trigger.

3. *Gib, gib spring, or extractor spring.*

Release lock spring and remove:

- (a) Lock spring axis pin.
- (b) Keeper bracket, lock spring, and extractor levers.

(c) Keeper pin of extractor stop.

(d) Extractor stop and extractor.

(e) Push out gib spring cover.

(f) If extractor spring is to be replaced drive out its fixing pin and remove.

4. *Sear.*

Compress lock spring and:

- (a) Lift sear clear of firing pin.
- (b) Drive out sear axis pin.
- (c) Remove sear.

5. *Tumbler.*

Compress lock spring and:

- (a) Drive out tumbler axis pin.
- (b) Pull trigger back slightly.
- (c) Remove tumbler.

NOTE: The serviceable components are replaced in the reverse order.

MOUNTING, TRIPOD, .303-INCH MAXIM GUN, MARK IV.

The mounting consists principally of a crosshead, elevating gear, and socket, mounted on three legs.

It is constructed to give 13 degrees elevation and 25 degrees depression at heights varying from 14½ inches to 30 inches from the axis of the gun to the ground. By arranging the position of the rear and front legs respectively, elevation may be given up to about 43 degrees and depression to 55 degrees. An all round traverse can be obtained.

The crosshead, to which the gun is pivoted, is formed with a pivot to fit into the socket and an arm which carries the elevating gear.

The elevating gear, which is actuated by a handwheel, consists of an inner and outer screw (right and left-handed) and a nut working within a tumbler. The tumbler is split and provided with a jamming bolt, by which the wear may be taken up.

The socket is bored to receive the crosshead and is provided with three lugs, to which the legs are hinged; a jamming block and screw with handle is attached to the front to secure the crosshead in any desired angle of traverse; the block works in a recess in the upper portion of the crosshead and prevents it from rising. Both faces of the rear lug and one face of each front lug are fitted with clutch plates having radial serrations to correspond with similar serrations on the faces of the leg joints. Joint studs with disc spring and jamming handle are fixed to the front lugs, by which the legs are securely clamped to the socket in the required position.

The legs are of tubular steel, the lower ends being fitted with shoes to steady the mounting on the ground, and the upper ends having a joint with radial serrations mentioned above. The rear leg is provided with a joint pin with nut and jamming handle.

On a portion of the periphery of the leg joints numbers are stamped at regular intervals so that when read in conjunction with a zero mark the relative position of the

legs to their normal position may be readily seen.

A strap is fixed to the rear leg to secure the three legs during transport.

When firing, the ammunition box is placed on the ground on the right side of the gun.

Weight of mounting . . . 48 lbs.

METHOD OF CARRYING TRIPOD MOUNTINGS ON CARRIAGE, M.G., INFANTRY MAXIM.

Mountings will, when issued to the Special Reserve and the Territorial Force, be carried in the wire receptacle of Marks II, II* and III Infantry Carriages.

The crosshead will be carried separate from the tripod, and both will be secured with the drag ropes already carried) by two straps to the wire receptacle.

HOOD PROTECTING:

MARK IV TRIPOD GUN MOUNT.

The hood is made of leather, lined with brown felt, and is for use in protecting the gun mount when tripod is carried in G.S. limbered wagons.

PACKSADDLERY, MACHINE GUN, .303-INCH.

The packsaddlery for use with equipment supplied with the Mark IV Tripod will be as follows:

Description.	Per gun and tripod set.	Per ammunition set.	Weight of each article.
<i>Section No. 5A.</i>			lbs. ozs.
HARNESSES, POLE-DRAUGHT, G.S.			
Cases, horse-shoe, harness .	I	I	I 0½
<i>Section No. 5B.</i>			
PACKSADDLERY, G.S.			
Bits, bridoon (f)	I	I	0 15
Bars, hanging, Mark II pairs (d)	—	I	6 6
Breechings, Mark III, IV or V	I	I	I 13½
Chains, collar, G.S., Mark III	I	I	2 2
Collars, breast, Mark III, IV, or V	I	I	I 8½
Collars, head, Mark III or IV	I	I	I 12
Cruppers, Mark III or IV (large) or Mark V	I	I	0 10½
Girths, Mark III, IV or V pairs (c)	I	I	0 13
Girths, leather, Mark I (d)	—	I	0 11
Pannels, Mark III or IV (small) or Mark V pairs (b)	I	I	II 0

(c) As Mark V girths are not held on charge in pairs, 2 single girths will be required with each tree.

(d) When "racks Mark II" (canvas) are issued, 1 pair of "bars hanging" and 1 "girth, leather" will be required. When "racks, Mark I" are used, the "girth, web, racks and hangers" is used with it. It is not suitable for the Mark II rack; neither are the "bars, hanging" and "girth, leather," suitable for the Mark I rack.

(f) Or bits, snaffle, with head in lieu.

Description.	Per gun and tripod set.	Per ammunition set.	Weight of each article.
			lbs. ozs.
Reins, bridoon	I	I	0 12
Straps, girth, Mark II . . .	4	4	0 4½
Surcingles, Mark III . . .	I	I	2 2
Trees, adjustable	I	—	7 4
Trees, Mark III or IV (small) modified	—	I (a)	11 12
PACKSADDLERY, MACHINE GUN, .303-INCH.			
Bottles, water	I	—	6 8
Caps, shovel, Mark II . . .	—	I	0 11
Frames, wood, Mark II . . .	I	I (a)	4 0
Girths, web, racks and hangers, Mark II (d)	I	I	1 10
Hangers, gun, adjustable tree	I	—	10 12
Hangers, tripod, adjustable tree	I	I	9 10
Rack, boxes, (Mark I (d) } ammunition or in (Mark II (d))	—	2	15 1
belts			4 12
Straps, girth (e)	4	4	0 1½

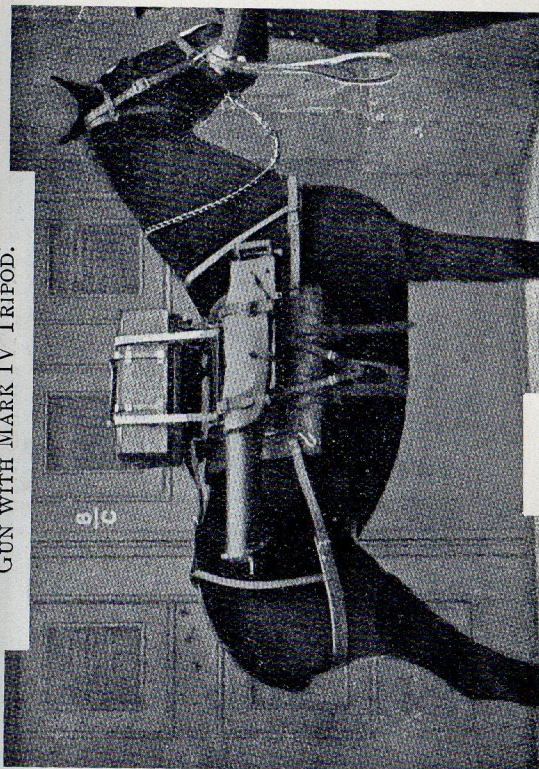
(a) Frames, wood, Mark I, will be issued with trees, small. Packsaddlery, M.G., until the stock of the latter is exhausted, when the Packsaddlery, G.S. Tree, small, Mark III or IV (modified) (15219 L. of C.) or Tree, Adjustable and frame, wood, Mark II, will be issued in lieu.

(b) 1½ lbs. of horse hair will be issued with each pair of new pannels. This should be put under the quilted parts, if necessary, after the pannels have been worn a short time.

(d) When "racks Mark II" (canvas) are issued, 1 pair of "bars, hanging" and 1 "girth, leather," will be required. When "racks, Mark I" are used, the "girth, web, racks and hangers" is used with it. It is not suitable for the Mark II rack; neither are the "bars, hanging" and "girth, leather," suitable for the Mark I rack.

(e) For "girths, web, racks and hangers" only.

GUN WITH MARK IV TRIPOD.



Off side.

To face page 80.

The Loads will be distributed as under:

Near side.	Weight.	Centre on "Frame, wood."	Off side.	Weight.
Tripod, Mark IV . . .	lbs. 47	Box 32 lbs.	Gun	lbs. 67
Bottle, water . . .	21			67
	68		Total .	67

MARK IV TRIPOD.



Near side.

STOPS CARRIED INGS LIMBERED WAGONS FOR CAVALRY MACHINE GUN SECTION:

Articles.	No.	Approximate weight.		Where carried.
		lb.	ozs.	
FORE PORTION.				
Bar, carrying Maxim gun on tripod	1	1	10	Along top of ammunition belt boxes
Belts, ammunition, Maxim, .303-inch, 250 rounds	14	292	8	} As shown.
Box, spare parts and implements, Maxim, .303-inch (filled) (a)	2	32	4	
Cans, filled (lubricating, No. 9 (b))	1	31	10	As shown.
Cans, filled (half-pint (c))	2	1	0	} In case as shown.
Cases, can, .303-inch tripod mountings	2	0	14	
Flamette	3	2	3	As shown.
(machine, protectors, muzzle	3	0	3	Rolled in "Linen, old" as shown.
Guns { Maxim, .303-inch, in leather case, with cleaning rod and spare gun barrel	1	0	3	In case with gun.
Linen, old { plugs, cork complete	103	4	4	As shown.
Mountings, tripod, .303-inch Maxim gun, Mark IV, complete, with hoods, protecting.	1	0	8	See above.
	1	50	0	In leather case as shown.
(a) 10 yards of spare cord for mekometers are carried in addition to the usual stores, in this box (in one of the two wagons).				
(b) For mineral oil 1				
(c) For petroleum oil 1				
(d) For turpentine 1				
METHOD OF CARRYING. Remove dividing board and place diagonally across rear part of rear portion of wagon. Place gun in centre of fore portion, from front to rear. Eleven belt boxes on one side (end on to gun case), with tripod in hood (legs flat on floor), and spare part box as a wedge between it and the gun case on the other side, prevent a lateral motion without detriment to speed in handling the gun. Remainder of boxes (3) at end of tripod legs. Heavy end of gun and tripod to rear of wagon.				
REAR PORTION.				
Axes, { head, 4 lbs.	1	1	7	In case with gun.
pick { helvets, 36-inch, ferruled	1	10	0	} With mounting as above.
Blankets, saddle (d)	1	0	5	
Cartridges, small arm, ball, .303-inch cordite boxes (e)	1	0	4	In case with gun.
Hook, bill	1	0	1	Rolled in "Linen, old" as above.
Luggage, saddle, with appurtenances, etc., shown in Cavalry, F.S. Manual	4	4	8	} In bottom of rear of wagon, loose.
Machine, belt-filling, in chest (f)	10	3	4	
Packsaddle, machine gun, .303-inch (g)	2	10	4	In four boxes in front bed of wagon.
Shovel, G.S.	322	0	0	Loose under harness.
Strapped round luggage saddle.	43	4	4	Rolled in blanket under packsaddle
Strapped round luggage saddle.	42	0	0	Right front under packsaddle.
Stripped as shown.	214	0	0	Stripped as shown.
With pick in bottom of wagon (rear part).	3	8	8	With pick in bottom of wagon (rear part).
Strapped round luggage saddle.	1	0	15	In bottom of wagon.
Valise, horseshoe, with 3 sets of shoes (a, i, nails)	1	20	0	
LOAD				
G.S. limbered wagon equipped with spare parts and wagon equipment stores	1,194	3		
Total loaded G.S. limbered wagon	1,269	13		
	2,464	0		= 22 cwt. (about).

(d) For off horses.

(f) On
for use.

(e) Fore part.

(f) Only carried by one of the two wagons. The box is carried loose in the rear portion for use.

(g) Gun packsaddle in fore part, 2 ammunition pack saddles in rear part. *See* footnote.

* A set of machine gun packsaddlery consists of 1 gun packsaddle and 2 ammunition packsaddles. Each ammunition packsaddle has two racks, and each rack will accommodate three belt boxes.

The M.G. packsaddlery is normally carried in the limbered wagons. When required for use it will be carried in the limbered wagons, and each pack will accommodate three belt boxes.

Each of the draught horses of the vehicle, allotted to the man

† One of the two wagons will carry an extra box of S.A.A.

STORES CARRIED IN G.S. LIMBERED WAGON FOR INFANTRY MACHINE GUN SECTION.

Articles.	No.	Approximate weight.		Where carried.
		lb.	ozs.	
FORE PORTION.				
Axes, pick { head	1	4	8	} Across rear of wagon on top of belt boxes.
{ helve, 36-inch, ferruled	1	3	4	
Bags, sand, common	15	8	14	Off hind portion in bundle as shown.
Bar, carrying Maxim gun on tripod	1	1	10	On top of gun case.
Belts, ammunition, Maxim, 303-inch (in boxes) (a)	14	292	8	As shown.
Box, spare parts and implements, Maxim (filled) (b)	1	31	0	Off fore portion under belt boxes.
{ lubricating, No. 9 (c)	2	14	10	} Off hind corner.
{ half-pint (d)	2	—	14	
Cases, cans, 303-inch, tripod mountings	1	2	3	} Under sand bags, off hind corner.
Climometer, field (in case)	1	2	8	
Drum, oil, 3 gallons, with bung (containing spare supply of water	1	37	8	As shown.
Flannelette yds.	6	—	4	With clinometer.
Guns { machine, protectors, muzzle	1	—	3	In case with gun.
{ 303-inch, complete (in leather case, with cleaning rod and spare gun barrel)	1	103	4	} In case as shown.
{ Maxim { plug, cork, complete	1	—	1	
Hooks, bill	1	2	0	Between gun case and rear side of wagon.
Lamps, siege, candle with stand (in box)	2	12	10	In box as shown.

(a) Each belt contains 250 rounds, S.A.A.

(b) Contains in addition to usual stores, 20 yards of spare cord for mekometers.

(c) One for mineral oil, one for oil, petroleum, Russian, lubricating, packed in the case, can, 303-inch.

(d) One for oil, petroleum, Russian, lubricating, one for turpentine, packed in the case, can, 303-inch.

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Line, off for cleaning.				
MOUNTINGS { 303-inch Maxim gun, Mark IV, complete (with hood protecting) tripod				
{ pins, joint { crosshead	1	1	0) With flannelette round clinometer.
{ pins, joint { elevating gear	1	50	0	
Muzzle attachment, for ball firing	1	—	10	As shown.
Plug, belt, Maxim, 303-inch	1	1	7	In case with gun.
Reflector, mirror, M.G., 303-inch	1	—	4	In case with gun.
Shovel, G.S.	1	3	8	Rolled in with clinometer.
HIND PORTION.				
Axes, pick { head	1	4	8) Loose in bottom of wagon.
{ helve	1	3	4	
Bags, sand, common	15	8	14	In near fore portion under lamps, siege.
Bar, carrying Maxim gun on tripod	1	1	10	In bed of wagon.
Belts, ammunition, Maxim, 303-inch (in boxes) (a)	14	292	8	10 along off side bed; 4 on top off fore corner.
Blanket, saddle (e)	1	5	4	Round saddle.
Box, spare parts and implements, Maxim (filled)	1	30	12	In middle of bed of wagon as shown.
Cans { lubricating, No. 9 (c)	2	1	10) In cases under seat.
{ half-pint (d)	2	—	14	
Cases, cans, 303-inch, tripod mountings	1	2	3	As above.
Climometer, field (in case)	1	2	8	In corner next siege lamp, as shown.
Drum, oil, 3 gallons, with bung (containing spare supply of water)	1	37	8	Under seat.
{ machine, protector, muzzle	1	—	3) In case with gun. Fore and aft along bed of wagon in middle.
{ 303-inch, complete (in leather case, with cleaning rod and spare gun barrel)	1	103	4	
Guns { Maxim { plug, cork, complete	1	—	1	In bed of wagon.
Hook bill	1	2	0	In near fore corner.
Lamps, siege, candle, with stand (in box)	2	12	10	In blanket, saddle, as shown.
Luggage saddle, with appurtenances, etc., as shown in Infantry F.S. Manual	1	43	4	

(e) For the off-horse.

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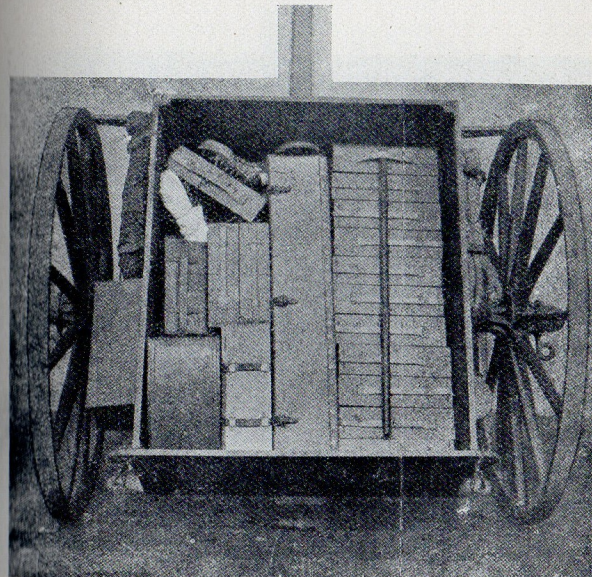
STORES CARRIED IN G.S. LIMBERED WAGON FOR INFANTRY MACHINE GUN SECTION.—*cont.*

Articles.	No.	Approximate weight.		Where carried.
		lb.	ozs.	
Machine, filling belts, Maxim, .303-inch, Mark II (in chest) (1)	1	42	0	In off hind corner.
Mountings, { .303-inch Maxim gun, Mark IV, complete (with hood, protecting)	1	50	1	Athwart floor at rear of wagon.
tripod { pins, joint, elevating gear	1	—	10	
Muzzle attachment for ball firing	1	1	7	In case with gun.
Reflector, mirror, M.G., .303-inch	1	1	5	In case with gun.
Shovel, G.S.	1	3	1	Fore and aft on near side.
Valise, horseshoe, with two sets of shoes, and nails	1	12	0	Alongside shovel and case, spare, as shown.
Load	—	1,224	9	
G.S. limbered wagon equipped with spare parts and wagon equipment stores	—	1,269	13	(Kits as shown).
Total loaded G.S. limbered wagon	—	2,494	6	22½-cwt. (about).

N.B.—In addition to above, the packs of Nos. 1, 2, 3 and 4 of Infantry machine gun detachments will be carried in the hind portion of the limbered wagon.

(1) The chest is carried loose in the vehicle, and the machine is clamped to the perch for use, 4 spare springs, action lever and 2 spare springs, pawl, are also in the chest.

WAGON, LIMBERED, G.S.
Fore portion.
PACKED FOR CAVALRY MACHINE GUN SECTION.

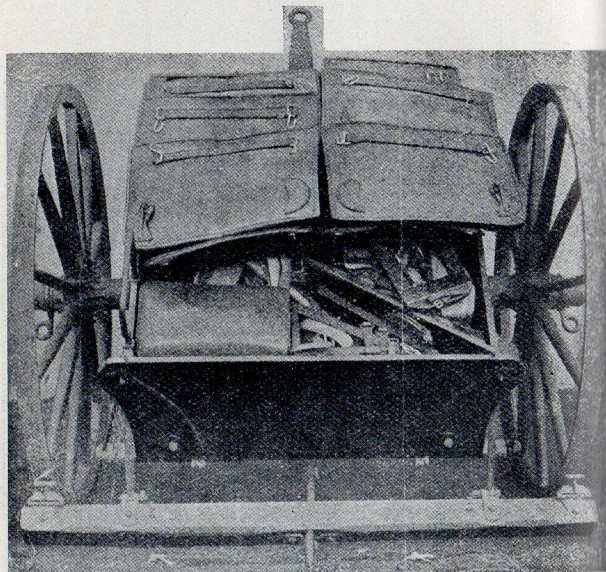


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WAGON, LIMBERED, G.S.

Hind Portion.

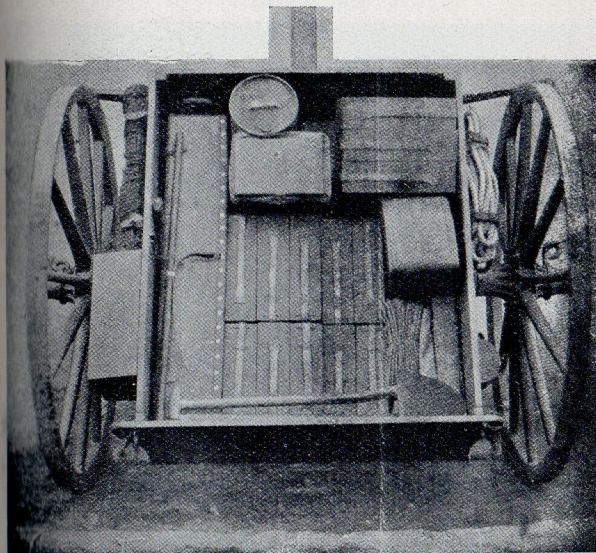
PACKED FOR CAVALRY MACHINE GUN SECTION.



WAGON, LIMBERED, G.S.

Fore Portion.

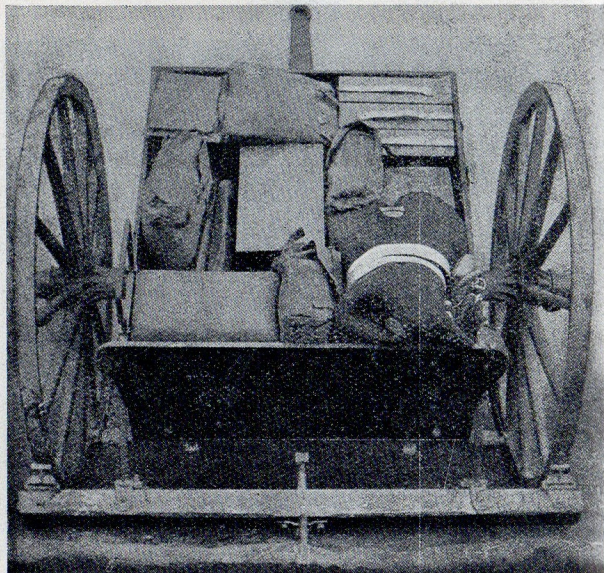
PACKED FOR INFANTRY MACHINE GUN SECTION.



WAGON, LIMBERED, G.S.

Hind Portion.

PACKED FOR INFANTRY MACHINE GUN SECTION.

*To face page 87.*

THE TRAINING OF MACHINE GUN SECTIONS.

1. The two non-commissioned officers and twelve privates shown in the establishment of a machine gun section will be trained as the battalion machine gun section. Two non-commissioned officers and twelve men in addition will be trained, as opportunity offers, as a reserve section to replace casualties.

2. A subaltern officer, other than the assistant adjutant, will be selected in each battalion to command and train the machine gun section, under the orders of the battalion commander. Should a brigade commander desire to train the machine guns of his brigade to act together, an officer, who is not the machine gun officer of one of the battalions of the brigade, may be selected to supervise the firing practice and to conduct the brigade training of machine gun sections.

3. Soldiers selected for duty with a machine gun section should possess, as far as possible, the following qualifications: good physique, calm temperament, fair education, and mechanical aptitude; their eyesight should be tested by a medical officer. The standard of eyesight required is the possession of full distant vision ($V = \frac{6}{6}$), without glasses, with either eye, as tested with the Army Test Types at 20 feet. The refraction

of the eyes must be such that with a + 1.D. spherical glass the distant vision of either eye is rendered inferior to that with the naked eye.

4. It is most important that men selected for the machine gun section should remain with it as long as possible in order that they may acquire a high standard of skill. Young soldiers of about a year's service are therefore the most suitable for selection. The battalion machine gun section will fire the range practices prescribed for the rifle in the "Musketry Regulations, Part I" with one of the companies of the battalion, but will at other times be at the disposal of the machine gun officer for instruction. The classification of detachments will be determined by battalion or depot commanders after the annual machine gun course.

5. The elementary training, which may be carried out in the neighbourhood of barracks, will consist in instruction in the mechanism of the gun; in adjusting the tripod, mounting and dismounting the gun, and loading; in the drill and methods of laying, ranging, and firing; in packing and unpacking limbered wagons; in filling a belt quickly and correctly; in the use of the range finder; in semaphore signalling and in the signals for the observation and control of fire.

6. As soon as the men of a section are thoroughly conversant with the mechanism, and have qualified in the tests of elementary

training for the machine gun (*see* page 131), their further training will be carried out, as far as possible, in open country away from barracks. During this training the sections should be practised in bringing the gun into action; in fire discipline; in fire control; in laying and ranging in every variety of country; in utilizing natural cover when advancing into action; and in constructing cover from both view and fire. The men should also be trained in range taking, judging distance, and in the use of field glasses.

7. When the section is proficient in these branches of training, the battalion commander will arrange for it to be trained with one or more companies which have reached the more advanced stages of company training, in order that it may be practised in co-operating with other troops, and in dealing with such situations as would confront it in war.

DRILL OF THE MACHINE GUN SECTION.

ELEMENTARY TRAINING.

1. The elementary training of the machine gunner will be carried out as directed in pages 101-112.

He must be taught, at an early stage, to

hold the gun so that sufficient pressure is applied to the handles to check its vibration without transferring the vibration to the mounting.

Machine guns vary considerably and such variations can only be counteracted by a thorough knowledge of the particular gun and by skilful holding. Whenever the gun is laid, the holding should be such as would be employed in actually firing service ammunition. This can only be judged by the man himself, but the habit of good holding is so important that this should be impressed upon the men.

2. An early opportunity should be taken to demonstrate with a few rounds of ball ammunition at 30 yards' range the necessity for correct holding. This may be done by a trained number firing a few rounds with different pressure on the handles.

3. During this elementary training, untrained numbers should attend on any occasion when firing is being carried out. They should also be present when the gun is stripped by the armourer.

ALLOCATION OF DUTIES.

The various duties to be carried out by the officer, non-commissioned officers and numbers of a section, are enumerated below.

It is important that all numbers should be interchangeable in order that casualties may

be efficiently replaced in action. In allotting the various duties for active service, section officers should select the men who show a particular aptitude for each particular duty, and the next best should be those who would probably be most quickly available on service to replace a casualty. Table C, Range Takers' Tests, and Tests in Belt Filling, will assist in detailing the numbers, and for this purpose section officers will keep careful record of the characteristics and particular aptitude of each number. Nos. 1, 2 and 3 should be successively the best for laying and holding; Nos. 6 and 5 for range taking, and No. 4 for belt filling. In peace, the numbers should frequently change rounds as directed below.

The duty of keeping the gun firing under all circumstances when required should be a point of honour with machine gun detachments.

The section officer. To select approximate gun positions, give instructions to the sergeant regarding such positions, line of fire, and target; give instructions to range takers as to objects on which to range; call up guns and give necessary instructions to Nos. 1 under cover if possible; decide aiming mark, method of sighting, and fire; order the opening of fire; observe; order necessary alterations of point of aim or sighting; control fire generally; cease fire; withdraw; abandon guns temporarily or advance as

circumstances dictate; watch the tactical situation; regulate the ammunition supply, and give general instructions regarding the movement of limbered wagons. If brigaded, repeat and pass orders of brigade machine gun officer, watch for signals, and act as he may direct. He should be particularly expert in observation of fire.

Sergeant. To select actual gun positions and supervise guns coming into action as the section officer may direct. Be conversant with the situation and instructions received by the section officer; at once assume command of the section in the event of the officer becoming a casualty or being temporarily absent; he must be thoroughly acquainted with the duties of a section officer as regards tactical handling and control of fire, and should be practised, in this respect, occasionally. He must be proficient in observation of fire and in handling the gun.

Corporal. He should be generally responsible for the packing of the limbered wagon, and on the line of march should march behind it, work the brake as required, and be responsible for the contents. On the order to unpack he will lower the tail board, superintend the unpacking, and take command in the absence of the section officer and sergeant. He will see the Nos. 4 put the rifles of Nos. 1, 2 and 3 in the wagon. He

will have the spare parts box handy, supervise the ammunition supply and filling of belts; direct the limbered wagon as required; superintend the filling of sandbags, cutting of brushwood, and watch for signals from the section officer. He will be prepared to take the place of the sergeant should he become a casualty, and must therefore be thoroughly acquainted with the duties. He will occasionally act as sergeant during training. He must be particularly proficient in the use of the belt-filling machine and in filling belts by hand.

Gun Numbers.—In order that each man may be thoroughly trained in peace in the various duties connected with the gun, a number of each detachment will be detailed on a weekly roster to clean and look after his detachment gun. He will personally clean the gun and be responsible that the mechanism is kept in thoroughly good working order. The duty number for the week will act as No. 1 for any tactical exercises or field days that may occur during his tour of duty. When relieved, he will become No. 2 for the next week, and so on in succession.

During Brigade and Divisional Training, Manœuvres, and Field Firing with ball ammunition, the section officer should vary the tours of duty so that, as far as possible, each man is afforded practice as No. 1 in

each of these exercises. At any special or extra firing, the detachment should be allotted the duties they would be respectively detailed for on mobilization; any change of duties will be ordered in sufficient time to enable the new No. 1 to look over his gun and ensure that it is serviceable before leaving camp or barracks.

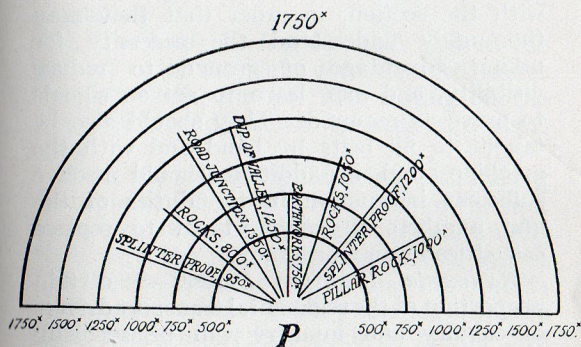
The following are the duties of the various numbers:

No. 1—Is the firer. He will personally clean and look after his gun; ensure that the mechanism is working smoothly. On going into action he will carry the tripod and place it in a suitable position, and assist No. 2 in mounting the gun. He repeats all orders received.

No. 2—Assists No. 1 at the gun, carries the gun into action, and mounts it with the assistance of No. 1. In action he will *watch for signals* from the section or brigade machine gun officer, *attend to the feeding of the gun*, and generally assist No. 1, but not observe fire.

Nos. 3 and 4—Are ammunition carriers. No. 3 takes the first supply of ammunition to the gun, assisted by No. 4, who also carries the first-aid case. No. 4 takes ammunition from the limber to No. 3 as a further supply is required. No. 4 places his own rifle and those of Nos. 1, 2 and 3 in the limber.

No. 5—Acts as scout. Without further orders he will move to the front, flank or rear of the guns, according to the position of the section on the march, if brigaded. If the section is acting independently, he will scout as ordered by the officer. In action his duty will be to watch the country in the most exposed direction, particularly



to watch for and report any movement of the enemy, or any developments in the tactical situation. He may, if necessary, be required to observe fire and signal the results.

No. 6—Range Taker. He will take ranges as ordered by the section officer or brigade

machine gun officer, as the case may be, in the first instance, and subsequently continue to take ranges to prominent objects, both near and distant; the latter to serve as key ranges in a subsequent advance; also to a flank. He will prepare range charts. (*See Diagram.*)

Drivers.—The transport drivers of the limbered wagon and Small Arms Ammunition cart should be frequently exercised with the section, in order that they may thoroughly understand the necessity for taking advantage of ground to reduce visibility, and may learn to act on signals to move as required. They should also be taught to fill belts by hand and with the machine, and in addition should receive sufficient instruction in the duties of the gun numbers to enable them to replace casualties in an emergency.

Regimental Transport Drivers—A certain proportion of the regimental transport drivers of cavalry and infantry will be specially trained to drive the general service limbered wagon for machine guns.

The special training referred to should enable these drivers to act correctly in the case of emergency during action.

BELT FILLING.

1. The corporal and all the numbers, as also the drivers of the limbered wagon and S.A. Ammunition cart, should be instructed and frequently practised in belt filling, both by hand as well as by the belt-filling machine. This is very important, for on service the transport drivers will frequently be required to fill belts, and should be particularly expert in the use of the belt-filling machine.

2. *One man—loading by hand.* Sit on the ground with the right foot doubled under the left thigh, the left foot resting on the outer side and drawn towards the right knee.

Place the belt on the left knee, with the tag pointing to the right. Take hold of the first brass strip between the forefinger and thumb; then with the remaining fingers and ball of the thumb, hold the belt so that the pockets will remain open. Take 5 cartridges in the right hand, insert into pockets, taking care to avoid doubling over the thin edge of webbing. Now place the belt on the knee, and placing the tips of the fingers on the front of the belt, finally adjust the cartridges by pushing them forward with the thumb until the points of the bullets are in line with the ends of the long brass strips. Continue to load and adjust in fives, and make a final inspection when placing the belt in the box.

3. *Belt-filling Machine.* (See Plate VII.)

Description. The belt-filling machine is designed to place the cartridges expeditiously and evenly in the ammunition belts, and is constructed so that it may be readily clamped on to the most convenient place.

The chief parts are the bed plate, pocket opener, removable crank handle with fixing pin and chain, crank, connecting rod, cam bar, hopper, traversing gear, hinged loading tray, and hinged leg.

In the Mark I machine, the crank handle is not made removable; also the loading tray and leg are not made to fold in the centre.

Weight of machine, complete, with hopper, 19 lbs.

Weight of loading tray and leg, $4\frac{1}{4}$ lbs.

Instructions for use. The machine must be fixed so that the crank handle can be worked with the right hand. The loading tray and the leg should be unfolded. The leg should be made rigid by turning up the keeper plate on to the pin catch, and the loading tray secured to the left of the bed plate by means of the pin, which is attached by a chain to the former. Turn the steel guide plate on the bed plate outwards; see that the pocket opener is back far enough to clear the belt; place the belt behind the roller and into the belt guide, the edge of the belt to be touching the side of the guide, the projecting ends of the long brass strips to

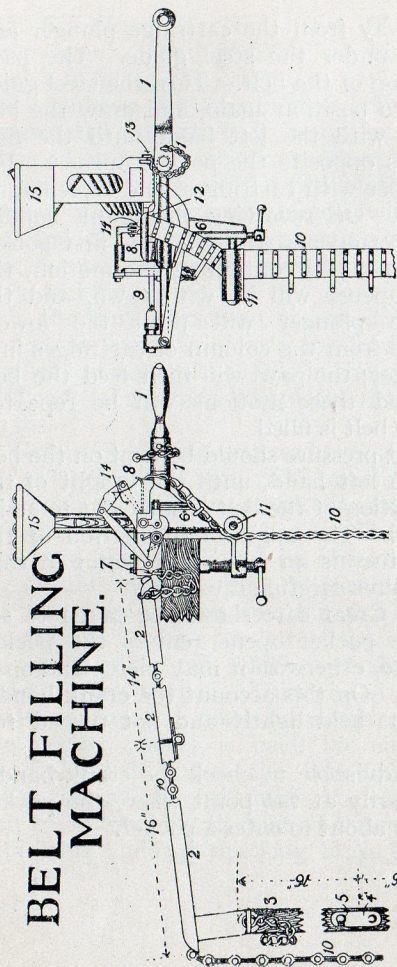
point away from the cartridge plunger and to pass under the steel guide. The pawl lies on top of the belt. Turn the steel guide plate into position again, and draw the belt through with the left hand until the first pocket is opposite the pocket opener. Fill the hopper with cartridges, and replenish as required. On revolving the crank handle, the pocket opener will enter the first pocket and open it; on continuing the motion, the pocket opener will be withdrawn, and the cartridge plunger will push the lowest cartridge from the column of cartridges into the pocket; the pawl will then feed the belt along and these motions will be repeated until the belt is filled.

A light pressure should be kept on the belt with the left hand, until the weight of the filled portion of the belt is sufficient to assist the pawl. The angle of inclination of the loading tray is an important factor in this, and requires careful adjustment.

N.B.—Great care should be taken to see that the pocket opener enters the pocket each time, otherwise it may pierce and spoil the belt. On this account the crank handle should be held lightly and not turned too fast.

It is advisable to check the crank handle momentarily at the point where the pocket opener is about to enter a pocket.

BELT FILLING MACHINE.



1. Removable Crank Handle with Fixing Pin and Chain.
2. Hinged Loading Tray.
3. Hinged Leg.
4. Keeper Plate.

5. Pin Catch.
6. Red Plate.
7. Pin Joint Bracket.
8. Plate Guide.
9. Pocket Opener.

10. Belt.
11. Belt Roller.
12. Belt Guide.
13. Cartridge Plunger.
14. Pawl.
15. Hopper.

Section drill, without transport.

1. The guns, with tripod and ammunition boxes, will be placed on the ground, muzzles to the front and in line, legs to the rear straps lapped round the rear leg and buckled, and clamps sufficiently tight to prevent the legs from hanging loose when the tripod is lifted off the ground; guns on the right, ammunition boxes 3 paces in rear of the guns. The guns should be a convenient distance apart, but not closer than 8 paces.

2. On the command *Fall In*, the detachments for the two guns will fall in in two ranks, 5 paces in front of the interval between the guns; the sergeant on the left of the front rank, covered by the corporal in the rear rank. The front rank will provide the right gun detachment, the rear rank the left gun detachment. (See Plate VIII.)

On the command *Number*, the section will act as in Squad Drill.

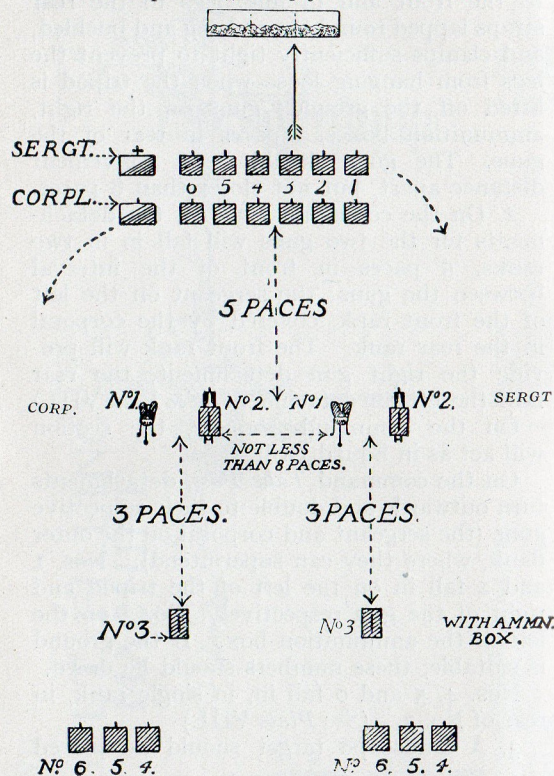
On the command *Take Post*, detachments turn outwards and double to their respective guns (the sergeant and corporal on the outer flank, where they can superintend). Nos. 1 and 2 fall in on the left of the tripod and right of the gun respectively, No. 3 on the left of the ammunition box. If the ground is suitable, these numbers should lie down.

Nos. 4, 5 and 6 fall in, in single rank, in rear of No. 3. (See Plate VIII.)

3. A landscape target should be placed

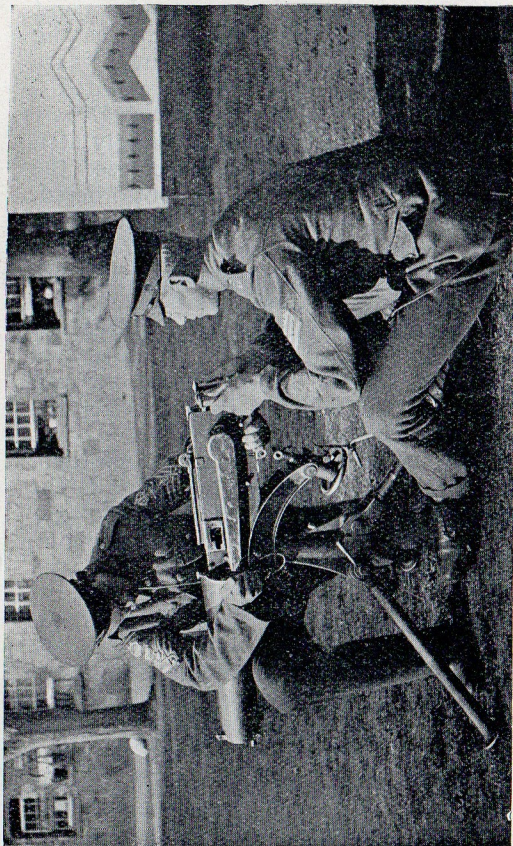
POSITION OF GUNS, MOUNTINGS AND GUN
NUMBERS AT COMMENCEMENT OF
SECTION DRILL.

Landscape Target, 25 yards from Guns



about 25 yards from the guns, and a point of aim indicated. The instructor having pointed out a spot—not more than 5 yards away, where each gun will be mounted—will give the command *Mount gun*. No. 1 picks up the tripod, having previously seen that both elevating screws are exposed the same distance, carries it to the spot ordered, and places it in position. In adjusting the tripod, he must ensure that the cross head and sights are upright, and that the legs are clamped tight. He must learn by experience the adjustment that suits him best for the position ordered and for the nature of the ground, so that he will not be cramped when firing and will not have to alter the tripod after the gun has been mounted.

As soon as the tripod is nearly in position, No. 2 picks up the gun and carries it to the right side of the tripod, holding the rear cross piece with the left hand, with the gun, muzzle to the rear, under the right arm. He then kneels on the left knee, facing the tripod, and, supporting the weight of the gun on the right knee, places it on the tripod, drives in and turns down the cross head joint pin, and removes the cork plug from the steam escape hole. (See Plate IX.) No. 1 fixes the elevating joint pin, and directs the gun towards the mark. Meanwhile, No. 2 kneels and places the ammunition box in position.



POINTS TO BE NOTED.

1. The method of supporting the gun on the right thigh by No. 2.
2. The assistance given by No. 1 in working the gun forward or backward while No. 2 drives in the crosshead.

No. 2 should time his advance so as to reach the tripod at the moment its adjustment is completed.

When No. 3 sees the gun is nearly mounted, he carries the ammunition box forward and throws or places it within reach of No. 2. The ammunition must be at hand directly No. 2 is ready for it. No. 3 then retires to his original place.

4. On the command *Load*, No. 2 passes the tag of the belt through the feed block. No. 1 grasps it with the left hand and pulls the belt straight through from right to left as far as it will go; he then turns the crank handle with the right hand on to the buffer spring, pulls the belt to the left front, and lets go. He repeats the same motions, and the gun is loaded and ready to fire. Each motion should be distinct and clean.

Single Shot Loading. When it is desired to practice men in single shot loading, as required in practices 2 and 4, Table "C," the gunner should carry out the first half of the loading motions. Then, without touching the belt, turn the crank handle on to the buffer spring, and let go.

"*At*" (name the aiming mark). No. 2 releases the traversing clamp, and No. 1 lays the gun approximately. No. 2 alters the position of the ammunition box if required.

Elevation required in yards. No. 1 repeats

the order for his own gun, raises the tangent sight, adjusts the slide to the distance given and aims, maintaining the same pressure on the handles while laying as when firing.

5. When the gun is laid and the clamp adjusted as required, No. 1 raises the automatic safety catch with the forefinger and prepares to fire. When No. 1 is ready, No. 2 holds up his hand. As proficiency increases, the pause between naming the object and the range should be slight.

On the command *Fire*, No. 1 presses the double button.

On the command *Cease Fire*, No. 1 releases the automatic safety catch, and remains steady.

6. Frequent instruction will be given in Traversing Fire. (See page 135.) The firer must first ensure that the traversing clamp is just sufficiently loose to enable the gun to be deflected by means of a sharp tap with the hand on the rear cross piece. Each man must learn by experience the exact degree of clamping he requires, and, before firing, he should ensure that the clamp is correctly adjusted to suit himself.

Traversing fire is applied by means of a series of groups fired at regular intervals within certain limits indicated by such figures on the target as may be ordered by the instructor.

The target will be the instructional machine gun target described on page 156.

Plate X. NORMAL POSITION WHEN FIRING ON LEVEL GROUND.



Note the method of "holding," with both elbows supported. This position should be regarded as the Normal one, and should be used until men are thoroughly experienced in firing. As proficiency increases, men may be allowed to modify their positions to suit themselves.

The procedure for horizontal traversing is as follows:

The instructor having described the figures between which fire is to be directed, will order *Traversing Fire*. The firer will lay the gun on the flank figure named and press the button, then tap the gun approximately to the centre of the interval to the next figure, again press the button, then tap, and so on until the limit ordered has been reached. The firer should be taught to fire groups of about 8 rounds by maintaining pressure on the button for about 2 seconds at each group. By this method he learns to tap the gun with the necessary force in order to avoid firing more than one group at the same place, and also to avoid leaving gaps in the line he is traversing.

As proficiency increases, instruction should be given in diagonal traversing. In this case the target will be three bands, each with three figures, as for horizontal traversing. The bands will be joined so that each of the outer bands is in the same vertical plane as the centre band, and forms an angle of 120 degrees with it. In this case the firer is taught to combine the use of the elevating wheel with tapping for deflection. The same principles as for horizontal traversing apply for this diagonal traversing.

Instruction should be afforded in traversing from right to left, as well as from left to right.

During the instruction fire should be

stopped at least twice in order to check the laying, and also to measure the distance traversed. By comparing the distance traversed with the number of groups fired, an estimate can be deduced as to the value of the traversing fire. For example: Traversing fire is ordered from the 1st to the 6th figure; fire is stopped after the 4th group. If the traverse has been correctly carried out, the gun should be laid on the interval between the 2nd and 3rd figures.

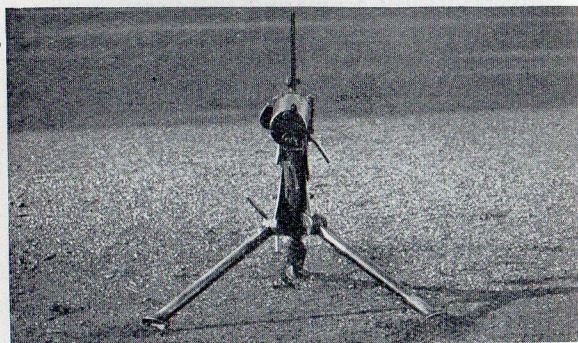
7. On the command *Unload*, No. 1 lowers the tangent sight, but not the slide, turns the crank handle twice in succession on to the buffer spring, letting it fly back each time on to the check lever; then presses up the finger pieces on the bottom pawls, while No. 2 withdraws and repacks the belt in the box; this must be done correctly, and the lid closed and fastened; No. 1 clears the ejector tube and lock, and releases the lock spring by pressing the double button.

8. On the command *Dismount gun*, No. 2 replaces the cork plug, passes the ammunition box to No. 3, removes the gun as in mounting, and replaces it in its original position in rear. No. 1 follows with the tripod. On reaching the original position, he tightens the traversing clamp, folds and clamps the legs, and sees that the joint pins are home and turned down.

9. Instruction should be afforded in bringing the gun into action in the several posi-

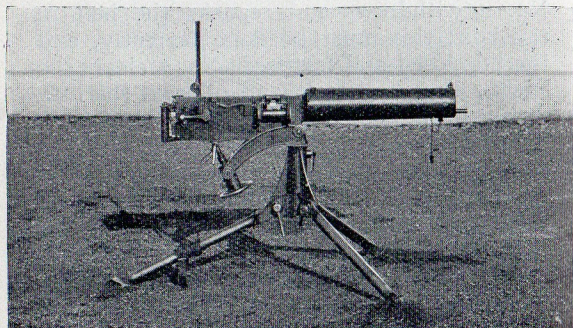
Plate XI.

GUN CORRECTLY MOUNTED FOR FIRING.
FIG. I. FRONT VIEW.



W. H. Jacob, Photo, Hythe.

FIG. II. SIDE VIEW.



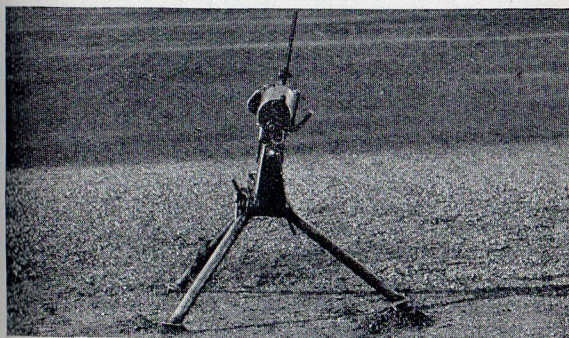
W. H. Jacob, Photo, Hythe.

POINTS TO BE NOTED.

1. Height of tripod suitable for average man to fire, sitting.
2. Legs firmly planted. Rear leg directly under the gun.
3. Crosshead upright.
4. Joint pins home and turned down.
5. Screws of elevating gear about equal.
6. Cork plug removed.

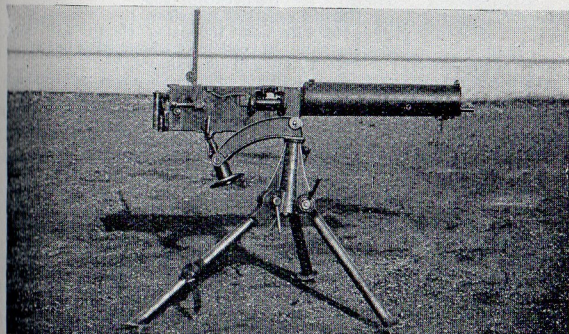
Plate XII.

GUN INCORRECTLY MOUNTED FOR FIRING.
FIG. I. FRONT VIEW.



W. H. Jacob, Photo, Hythe.

FIG. 2. SIDE VIEW.



W. H. Jacob, Photo, Hythe.

THE FOLLOWING POINTS SHOULD BE NOTED.

1. Tripod too high for the average man to fire, sitting.
2. Legs not firmly planted in the ground. Rear leg at an angle to the line of fire.
3. Crosshead leaning over and sights leaning.
4. Joint pin not turned down.
5. Small screw of elevating gear too short.
6. Cork plug not taken out.

tions of the tripod, and in various natures of ground. Firing up, down and along the side of steep hills should be practised. Practice should also be afforded in mounting the gun from the prone position, in firing from the lying position, and when kneeling on both knees, as well as when sitting. (See Plates XIII, XIV, XV.)

SECTION DRILL BRIEFLY SUMMARIZED.

Words of Command.	Duties, etc.
"Fall in." "Number." "Take Post."	See Plate VIII. No. 1 Looks to screws of elevating gear.
<i>No. 1 Repeats all Orders.</i>	
"Mount Gun."	No. 1 Adjusts tripod, clamping legs tight. No. 2 Mounts gun, drives in cross-head pin and removes cork plug.
"Load."	Motions distinct and clear. No. 2 Releases traversing clamp and looks to position of ammunition box.
"At" (aiming mark) "At" (Elevation required).	No. 1 Lays gun approximately. No. 1 Repeats order for own gun, adjusts sight and aims. No. 2 Adjusts traversing clamp to suit No. 1, and when ready holds up his hand.
"Fire."	No. 1 Presses double button. Ranging-fire. Groups of 10 to 20 rounds. Rapid fire 30 to 50 rounds.
"Cease Fire."	No. 1 releases safety catch and remains steady.
<i>For Traversing Fire.</i>	
From—Figure To—Figure "At" (Range). "Traversing Fire." "Unload."	No. 1 lays gun on flank figure named, presses button, then gives gun one tap, again presses button, then tap, and so on till limit is reached. No. 1 Down sight with left hand. Turns crank handle twice over with right hand. Raises bottom pawls, clears ejector tube and lock, then presses double button.
"Dismount Gun."	No. 2. Withdraws and repacks belt in box. No. 2 Replaces cork plug, passes ammunition box back to No. 3 and removes gun. No. 1 Follows with tripod, tightens traversing clamp, folds and clamps legs; sees joint pins home and turned down.

Drill with limbered wagons.

1. The detachment will be formed up in two ranks 6 paces from the rear of the wagon, facing outwards.

On the command or signal "*Action*," the driver dismounts and stands to his horses. The sergeant and Nos. 5 and 6 double out to the section officer. The corporal lowers the tail board and superintends the unpacking. The remaining numbers ground arms on the word of command of the senior number and fall out to the wagon to perform the duties detailed on pages 90-96.

The corporal selects a suitable covered position for the limbered wagon, if necessary.

2. On the command or signal "*Dismount guns*," the procedure for unpacking is reversed, and when completed, detachments fall in and take up arms by word of command.

Drill with pack transport.

1. On the march No. 1 will be on the near side, and No. 2 on the off side, of the animal carrying the gun. No. 3 will be on the off side of the leading ammunition animals, the remaining numbers march in rear of the ammunition animals. On the command or signal *Action*, No. 1 will off-load the tripod and No. 2 the gun; No. 3 will off-load the leading ammunition animal.

The corporal will select a suitable covered position for the pack animals. The other

duties of the various numbers are as on pages 90-96.

2. On the command or signal *Stand to*, Nos. 1, 2 and 3 will reverse the actions of off-loading. The detachment will then form up for marching.

Signals.

1. In many cases observation will be impossible from the gun position, and it will be necessary for observers to signal results from a flank.

The following semaphore code is used in signalling the results of observation of fire:

P = Plus: meaning fire observed at least 50 yards beyond target.

M = Minus: meaning fire observed at least 50 yards short of target.

T = Right: meaning fire observed to right of target.

L = Left: meaning fire observed to left of target.

C = Centre: meaning direction of fire correct.

U = Unobserved: meaning no observation obtained.

Q = Query: meaning fire observed, but its position uncertain.

R = Range: meaning range correct.

2. The signaller at the observation post should give the "call up" to show that the observers are ready. "P" and "M" may be repeated for multiples of 50 yards; thus

"PP" would mean, "Fire observed at least 100 yards beyond target." Signals should be repeated from the gun position if this can be done without disclosing the position to the enemy.

3. On all occasions when guns are firing, the following signals should be used in controlling fire:

By No. 2.

Hand up. = Gun ready to open fire.

By Controlling Officer.

Hand up. = Preparatory to opening fire.

Hand dropped. = Open fire.

Elbow close to the side, forearm waved horizontally. = Cease fire.

INSTRUCTIONS FOR THE MOUNTED DRILL OF MACHINE GUN SECTIONS OF MOUNTED UNITS.

(PROVISIONAL.)

THE SECTION.

1. FORMATIONS OF A SECTION.

1. The formations of a section are:

i. Line.

ii. Column of route.

2. In *line*, the subsections, as shown in Figs. 1 and 2, are in line at twenty yards'

interval, unless a different interval is specified. The section commander is two horse-lengths in front of the centre of the line.

3. In *column of route*, the subsections, as shown in Figs. 3 and 4, are in column at a distance of four yards. The section commander is half a horse-length in front of the centre of his section.

2. LINE—CHANGES OF DIRECTION AND FORMATION.

1. *Change of direction.*

The right subsection is the directing subsection. Changes of direction are made by wheeling or by forming column of route to the flank (Sec. 2, 3), and then forming line (Sec. 3, 2).

Line is formed to the rear by wheeling the subsections right about ("SUBSECTIONS ABOUT"), the guns still leading.

2. *Formation of column of route to the front.*

"FORM COLUMN OF ROUTE." The right subsection advances in column of route. The left subsection wheels half right, checking the pace as required, and wheels to the front when in rear of the leading section. Column of route may be formed from the left on the command "COLUMN OF ROUTE FROM THE LEFT."

3. *Formation of column of route to a flank.*

"COLUMN OF ROUTE TO THE RIGHT (LEFT)." Each subsection, forming column of route as it moves, wheels to the right (left); the subsection in rear checks its pace when necessary to obtain its proper distance from the leading subsection.

4. *Formation of column of route to the rear.*

Column of route to the rear is formed by wheeling the subsections about (para. 1), and then forming column of route as detailed in Sec. 2, 2.

3. COLUMN OF ROUTE—CHANGES OF DIRECTION AND FORMATION.

1. *Change of direction.*

The direction can be changed by wheeling the head of the column, or, if a retirement is desired, by wheeling each subsection about.

2. *Formation of line to the front.*

"FORM LINE." The leading subsection advances, forming line as it moves. The subsection in rear by increasing its pace, wheeling half left at once, and half right when opposite its place in line, takes up its position when opposite its place in line on the left of the leading subsection at twenty yards interval.

If ordered to form line to the halt ("TO THE HALT FORM LINE"), the leading subsection will move forward a distance equal

to its own length before halting, and the rear subsection will form on its left without increasing the pace.

If ordered to form line to the halt without advancing ("WITHOUT ADVANCING TO THE HALT FORM LINE"), the leading subsection halts and forms line, the rear subsection wheels to its left and moves to the flank until opposite its place in line; it then wheels to the front, halts, and forms line.

3. *To form line to the flank.*

"TO THE RIGHT (OR LEFT) FORM LINE." The leading subsection wheels at once to the right and forms line; the rear subsection wheels so as to

be at an interval of 20 yards

from the leading section, forms line, and places itself in line with that section. As soon as line is formed, the right subsection directs.

In forming to the halt, the leading subsection having wheeled to the flank advances a distance equal to its own length before halting.

THE BRIGADE GROUP.

4. FORMATION OF A BRIGADE GROUP.

1. The formations of a group are:

- i. Line.
- ii. Column of sections.
- iii. Column of route.

2. In *line*, the sections are in line at

twenty yards interval, unless a different interval is specially ordered. The group commander is two horse-lengths in front of the centre section commander.

3. In *column of sections*, the sections, each in line, are in column at such a distance that when the sections are wheeled to a flank the group will be in line.

4. In *column of route*, the sections, each in column of route, are in column at a distance of four yards.

5. LINE—CHANGES OF DIRECTION AND FORMATION.

1. *Change of direction.*

The centre section is the directing section. A change of direction can be made either by shouldering the group or by wheeling the sections to the flank, and then forming line (*see* Sec. 6, 2).

Line is formed to the rear by wheeling the subsections about.

2. *Formation of column of sections.*

i. *To the front.*

"FORM COLUMN OF SECTIONS." The centre section advances —followed by the left and right sections in succession

—the two rear sections taking up their positions by making half wheels.

ii. *To the flank.*

"SECTIONS Each section wheels to its
RIGHT (LEFT) right.
WHEEL."

3. *Formation of column of sections to the rear.*

Line is first formed to the rear by wheeling subsections about. Column of sections is then formed as described in para. 2, i.

4. *Formation of column of route.*

"FORM The centre section advances
COLUMN OF first in the required forma-
ROUTE." tion, and is followed in
succession by the left and

right sections.

5. *Formation of column of route to a flank, or to the rear.*

"COLUMN OF Each subsection wheels to
ROUTE TO THE the right and follows the
RIGHT (LEFT)." subsection in front as soon
as it has got its proper distance.

Column of route to the rear is formed by forming column of route to the flank and then wheeling the head of the column.

6. COLUMN OF SECTIONS—CHANGES OF DIRECTION AND FORMATION.

i. *Change of direction.*

The direction of the march is changed by wheeling the head of the column ["HEAD RIGHT (OR LEFT) WHEEL"].

Column of sections to the rear is formed by wheeling subsections about.

2. *Formation of line to the front.*

"FORM LINE." The centre section advances. The second and third sections, by increasing their pace and making half wheels, place themselves in line on the left and right respectively of the leading sections.

3. *Formation of line to a flank.*

"SECTIONS Each section wheels to the
RIGHT (LEFT) right (or left).
WHEEL."

4. *Formation of column of route.*

"FORM The right subsection of
COLUMN OF the leading section ad-
ROUTE." vances in column of route
followed by the left sub-

section. The other sections cover and follow as it comes to their turn.

Column of route to the flank can be formed by advancing in column of route as described and then wheeling the head of the column to the flank.

7. COLUMN OF ROUTE—CHANGE OF FORMATION.

i. *Formation of line to the front.*

Column of sections (Sec. 7, 3) is formed first and then group line (Sec. 6, 2).

2. *Formation of line to a flank.*

"TO THE
RIGHT (OR
LEFT) FORM
LINE." The leading section forms
line to the right at once
(Sec. 3, 3). The other sec-
tions form line to the right
when opposite their places

in line.

3. *Formation of column of sections.*

"FORM
COLUMN OF
SECTIONS." Each section forms line
(Sec. 3, 2) and the rear
sections then take their
proper distances from the

sections in front.

4. *Formation of column of sections to a flank.*

"COLUMN OF
SECTIONS TO
THE RIGHT
(LEFT)." The leading section forms
line to the right at once
(Sec. 3, 3). The remaining
sections move forward
until they reach the ground

where the leading section wheeled; they
then form line to the right, follow and cover.

MACHINE GUNS COMING INTO ACTION, SIGNALS, Etc.

8. SECTION COMING INTO ACTION.

I.—i. *With wagons.*

"FOR ACTION The sergeant and Nos. 1,
FRONT (RIGHT 2, 3, and 4 dismount and
OR LEFT) hand their horses over as
DISMOUNT." follows:

The sergeant to the lead driver of one of
the gun wagons; Nos. 1, 2, and 3 to the
Nos. 7, and the Nos. 4 to the lead drivers
of the ammunition wagons. Nos. 1 and 2
then take the guns into action as directed.
If it is not necessary to move the wagons
when the guns come into action, the corporal
dismounts and hands his horse to the lead
driver of the gun wagon not already holding
the sergeant's horse, and Nos. 7 and the
drivers also dismount.

ii. *With pack.*

"FOR ACTION The sergeant and Nos. 1,
FRONT (RIGHT 2, and 3 dismount and hand
OR LEFT) their horses over as follows:
DISMOUNT." The sergeant and Nos. 1
to Nos. 7, Nos. 2 to the
drivers of the gun pack horses, and Nos. 3
to the Nos. 4.

Nos. 1 and 2 then take the guns into
action as directed, and Nos. 3 each off-load
one of the ammunition animals.

If it is not necessary to move the horses
when the guns come into action, the cor-
poral dismounts and hands his horse to
No. 7. The drivers and Nos. 4 and 7 also
dismount.

2. One of the Nos. 5 will usually hold the
section commander's and range-taker's horses
when they dismount.

In peace, when there is not a second wagon

available in a subsection, No. 4 on dismounting will hand his horse over to No. 7.

9. CHANGING FROM WAGONS TO PACK.

1. On the command "PACK SADDLES" all dismount, Nos. 1, 2, and 3 handing over their horses to No. 7, No. 4 to the wheel driver of the ammunition wagon.

2. The drivers of the gun wagon unhook the lead horses, move them forward two horse-lengths, and unharness them, placing the harness in rear.

No. 1 brings up the gun pack, gun carrier and gun, and No. 2 the tripod carrier, spare part box and water-bottle, placing them on the near side of the near horse. No. 3 brings up the ammunition pack and carriers, and the wheel drivers the ammunition boxes, placing them on the off-side of the off horse. The two horses are then saddled up and the harness is placed in the wagon by the man who has finished first.

3. The lead driver of the ammunition wagon unhooks the off lead horse, moves it up one horse-length in front of the near horse, and unharnesses it, placing the harness in rear.

No. 6 brings up the ammunition pack and carriers, placing them on the off-side of the horse; and No. 4 the ammunition boxes, placing them on each side of the horse. Nos. 4 and 6 saddle up while the lead driver places the harness in the wagon.

10. SIGNALS.

SIGNAL.	MEANING.
1. The right or left hand, fist clenched, brought to the shoulder, elbow down; arm then extended in line with the shoulder pointing in the required direction; motion to be made twice.	"Column of route." The direction in which column of route is required is indicated by the direction of the arm at the end of each motion.
2. "Troops right (left) wheel" (<i>see</i> "Cavalry Training").	Section, or sections, right (left) wheel.
3. "Form line" (<i>see</i> "Cavalry Training").	i. "Form line."—When a group is in column of sections, or when a section is in column of route. ii. "Form column of sections."—When a group is in column of route, or in line.
4. Same signal as "form line," except that the person making the signal faces the right (left), and points in that direction.	"Line to the right (left)." —When a section or group is in column of route.

Fig. 1.
SECTION IN LINE (WITH PACK).

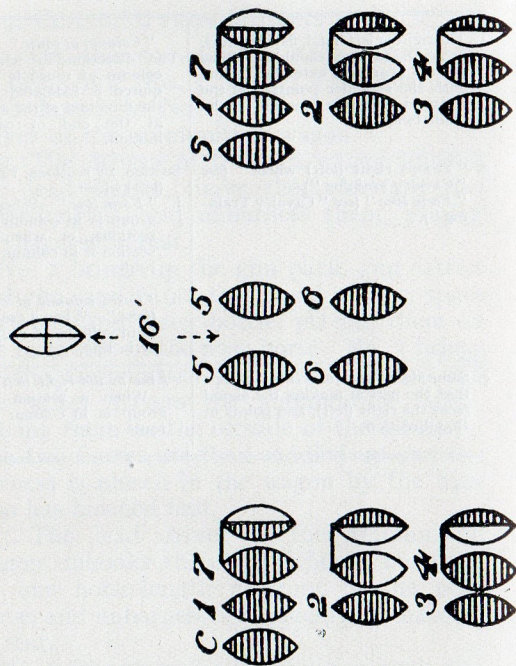


Fig. 2.
SECTION IN COLUMN OF ROUTE
(WITH WAGONS).

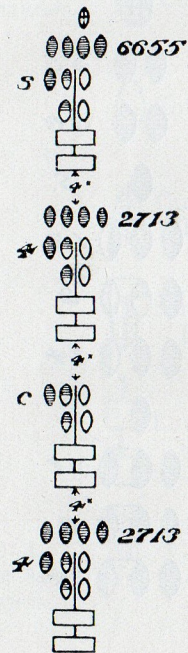
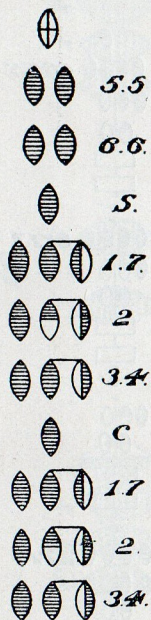
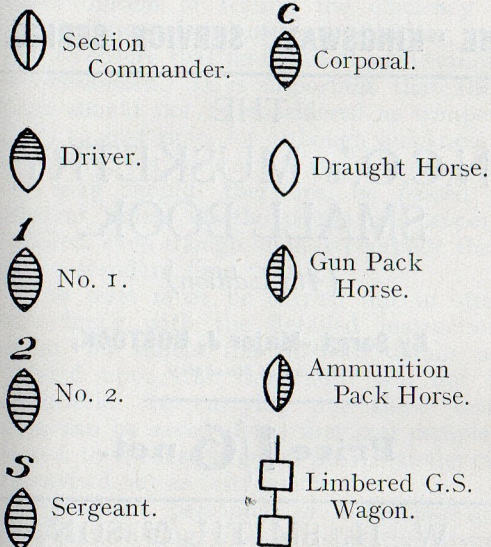


Fig. 3.
SECTION IN COLUMN OF ROUTE
(WITH PACK).



KEY TO FIGS. 1 TO 3.



No. 1 is Firer.
No. 2 assists No. 1.
Nos. 3 and 4 are Am-
munition Carriers.

No. 5. Scout.
No. 6. Range Taker.
No. 7. Horse
Holder.

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TESTS OF ELEMENTARY TRAINING.

The following tests have been devised to assist officers in testing the efficiency of their sections in elementary training, and also to ensure that no detail of such training is overlooked. It is important that these tests should not be considered as competitions against time, for although quickness is necessary, yet accuracy is the first essential. No man should, therefore, be passed as efficient unless all the points are properly fulfilled, even though he may complete them in the standard time.

The tests must be carried out in strict accordance with the detailed instructions given, for unless the smallest details are insisted upon, the time limit will not be applicable. In carrying out these tests, time can be saved if the first pair complete tests i. to v. consecutively; the remainder can be carried out as convenient.

The entire personnel of a machine-gun section, including, when possible, the drivers, should qualify in these tests, acting both as No. 1 and No. 2. This is necessary, for on service any member of a section may be required to replace a casualty at a moment's notice. In all tests No. 1 will repeat all orders received.

- i. *To erect the tripod and mount the gun on the command "Mount Gun."*

The tripod, gun, and ammunition box to be laid on the ground, with Nos. 1 and 2 standing one on each side of them. The clamps of the tripod legs to be sufficiently tight to prevent them from falling loose when lifted; they must be close enough together to enable the tripod to be put into the hood; the strap to be buckled round the rear leg; traversing clamp tight. The position where the gun is to be mounted to be not more than 5 yards away.

Points to be observed.

Cross head to be upright; all clamps tight; pins home and turned down; both elevating screws exposed the same distance; gun pointing to the front; cork plug withdrawn; Nos. 1 and 2, and an ammunition box, to be in position; tripod adjusted so that the gun is at a suitable height for No. 1 to lay and fire in a comfortable position without constraint. *Standard time, 30 seconds.*

- ii. *To load the gun on the command "Load."*

In continuation of i. Belt, with a few dummy rounds at the end, properly packed in the box, which will be closed and fastened.

Points to be observed.

All loading motions to be quite distinct and correct; to be carried out without any slurring. *Standard time, 6 seconds.*

- iii. *To adjust the sights and lay the gun on the completion of the command "At (object).....(Range)....."*

In continuation of ii. Gun loaded and ready to lay. Three objects will first be pointed out on a landscape target placed about 25 yards from the gun, but the No. 1 being tested will not know which will be given. Any range may be ordered so long as it will not be necessary to alter the slide by more than 500 yards up or down when the aiming mark is changed.

Points to be observed.

That the slide is adjusted and the gun laid with absolute accuracy. When checking the aim, "holding" pressure must be exerted on the handles; this may generally be done most conveniently by the instructor; but, should there be any question of different "holding," the No. 1 should hold the gun while the instructor checks the aim. No. 1 must be careful, however, that he does not exert lateral pressure when leaning to one side to clear the sights. *Standard time, 12 seconds*, from the range being ordered until No. 2 holds up his hand, indicating that No. 1 is ready to open fire.

- iv. *To unload the gun on the command "Unload."*

In continuation of iii.

Points to be observed.

Tangent sight lowered, but without moving the slide; unloading motions to be quite distinct, without slurring; belt withdrawn, repacked correctly in the box with lid closed and fastened; lockspring released. The ejector tube will not be cleared in the time allotted for the test. *Standard time, 6 seconds.*

- v. *To dismount the gun on the command "Dismount Gun."*

In continuation of iv. The gun will be dismounted, and, together with the tripod and ammunition box, will be placed in the same position as at the beginning of Test i.

Points to be observed.

All the points as at the beginning of Test i. and the cork plug replaced. *Standard time, 20 seconds.*

- vi. *To bring the gun into action on the command "Action" (object, range), e.g., "Action—fir tree—400."*

This test combines i. to iii. It emphasizes the necessity for proficiency in all details

required before a gun can open fire with effect. This test should, therefore, not be applied until proficiency has been attained in each of those that precede it. The numbers, gun, tripod and ammunition box will be as at the beginning of i.

Points to be observed.

All points as laid down for Tests i., ii. and iii. to be fulfilled. When No. 1 is ready to open fire, No. 2 will hold up his hand. *Standard time, 40 seconds*, from the range being ordered until No. 2 holds up his hand.

- vii. *Horizontal Traversing. On the command " (limits of traverse)..... Traversing Fire."*

The target will be a horizontal line of figures, khaki on green, 3 inches high and 4 inches apart from centre to centre, placed at 25 yards from the gun. The gun will be laid on any figure that may be ordered, sights set at 500 yards. The test will comprise traversing from *right to left*, as well as from *left to right*. On the command "Traversing Fire," No. 1 will fire a group at the figure named, then traverse, so that the next group will be fired at the interval to the next figure; the subsequent groups will be fired at a figure and a space alternately. Each time a group is fired, pressure will be maintained on the double button for ap-

proximately 2 seconds, which is about the time required to fire a group of 8 to 10 rounds. The test will not be completed until the space included between 5 figures, including the first named and the fourth from it, has been traversed. In order to ensure that the traversing is satisfactory throughout, the order to cease fire will be given at least once during the traverse, but not before 5 groups have been fired, and the laying will be checked; this will be repeated when the limit of the traverse is reached.

Points to be observed.

That the traversing clamp is just sufficiently loose to enable the gun to be deflected by a sharp tap with the hand on the rear cross piece; when checking the laying, that the sights are laid approximately correctly; the object is to test the traversing by ascertaining if the strength of tap has been correctly estimated, and not accurate relaying; tapping backwards to obtain accuracy of aim will not be allowed. By counting the number of groups fired, the point of aim can be calculated, e.g., fire opened on the first figure and stopped after the 7th group has been fired; the gun should then be laid on the fourth figure. *Standard time, 5 seconds for each complete series*, i.e., a group and a completed traverse; e.g., in the example above, the time taken should

have been 32 seconds, i.e., 6 complete series = 30 seconds; and a group = 2 seconds; total = 32 seconds.

viii. *Diagonal Traversing. On the command " (limits of traverse).....Traversing Fire."*

The target will be three lines of 3 figures as for vii. each joined at an angle of 120 degrees to the next.

The procedure will be as for vii. but in this test correct manipulation of the elevating wheel is included. Traversing will be from *right to left*, as well as from *left to right*.

Points to be observed.

As in Test vii. *Standard time, 6 seconds for each complete series*, as explained in Test vii.

ix. *Rectifying stoppages.*

The instructor will indicate the stoppage required by adjusting the crank handle of a spare gun, if available, or by holding a stick against a wall or target to exemplify the position of the crank handle which he wishes to illustrate. For example: Crank handle vertical; immediate action. The other positions of the crank handle can be similarly exemplified.

As an elementary test only, the "immediate action," *vide* Table of Stoppages, pages 66-67, will be required, but as proficiency

increases, the remedy of stoppages may be more fully tested by introducing variations in accordance with the tabulated list of stoppages, 5th column, "Remedy in Detail"; e.g., after the "immediate action" in above example has been applied, keep the crank handle in the same position, telling No. 1 at the same time, "Gun still stops." No. 1 should lighten the fusee spring or put on the muzzle attachment. In all cases the "immediate action" must first be applied.

Points to be observed.

That the correct remedy is applied and completed; that all motions are correctly and clearly carried out; that the gun is re-laid correctly after a remedy has been completed. *Standard time: The correct procedure to be begun within 3 seconds of the order "gun stops" from the instructor.*

x. *Belt filling.*

(a) A heap of 25 rounds of ball ammunition to be placed beside a man; these to be inserted in a belt. *Standard time, 1 minute.*

(b) As for (a), but 250 rounds to be inserted in a belt by one man. *Standard time, 12 minutes.*

Points to be observed.

Rounds to be placed anyhow in a heap and not arranged. Inspection of the belt on completion will show if it has been filled so as not to cause a fault in feed.

TESTS OF ELEMENTARY TRAINING.

Memory Table, Showing Commands, Times, etc.

No. of Test.	Nature of Test with Commands.	Standard Time.	Remarks.
I.	To Erect tripod and mount Gun. "Mount Gun."	30 sec.	Points—As on p. 132.
II.	To load the gun. "Load."	6 sec.	All motions distinct. No slurring.
III.	To adjust sights and lay gun. "At...(Object)...(Range)..."	12 sec.	From range being ordered until No. 2 holds up his hand.
IV.	To unload the gun. "Unload"	6 sec.	Motions distinct, belt correctly repacked, Lockspring released.
V.	To dismount the gun. "Dismount Gun."	20 sec.	All points as at beginning of Test I, and cork plug replaced.
VI.	To bring gun into action. "Action," (Object ..., Range)	40 sec.	All points for Tests I, II and III to be fulfilled. Time taken until No. 2 holds up his hand.
VII.	Horizontal Traversing (Limits of Traverse). "Traversing Fire"	5 sec. for each complete series.	Points as on p. 136.
VIII.	Diagonal Traversing (Limits of Traverse). Traversing Fire.	6 sec. for each series.	Points as in Test VII.
IX.	Rectifying Stoppages. "Gun Stops."	Correct procedure begun. 3 sec.	Correct remedy applied and gun re-laid after remedy.
X.	Belt Filling.	1 min. 12 min.	25 rounds.* 250 rounds.* *Placed in a heap—Pass thorough inspection when filled.

ELEMENTARY TRAINING IN TACTICAL HANDLING.

The following stages of training in tactical handling are suggested as a useful method of ensuring that all the numbers are well trained in all the duties connected with tactical handling before they fire ball ammunition on the field firing area.

To commence only after the Section have been thoroughly trained on the barrack square, i.e., Tests of Elementary Training passed, and have a thorough knowledge of mechanism.

FIRST STAGE.

One gun, one ammunition box, belt with 50 dummy cartridges, Nos. 1, 2 and 3 only; remainder to watch and change rounds, including the sergeant and corporal, so that all are exercised. The Instructor will previously select suitable positions for the gun, fulfilling the following requirements:

- (a) Gun position on fairly level ground.
- (b) Gun firing down a steep slope.
- (c) Gun firing up a steep slope.
- (d) Gun firing horizontally along a steep slope, both to the right and to the left.

(See Plates XIII, XIV and XV.)

Nos. 1, 2 and 3, with the gun, tripod and ammunition box, will be in a position of readiness not more than 10 yards from the

Plate XIII.

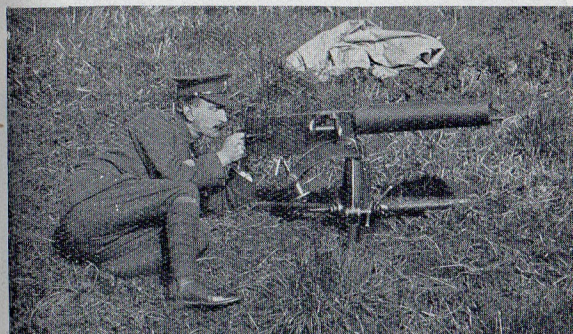
POSITION WHEN FIRING ALONG A STEEP SLOPE.

FIG. 1.



W. H. Jacob, Photo, Hythe.

FIG. 2.



W. H. Jacob, Photo, Hythe.

POINTS TO BE NOTED.

1. The firer has adopted a position most suitable to the ground; and one that enables him to rest both elbows:
2. In Fig. 1 the tripod is incorrectly set up. The rear leg, being the longest, should be down the slope and should rest, if possible, on a firm basis, e.g. a tuft of grass (or other stop), as in Fig. 2, in order to obtain the greatest stability.
3. The crosshead in Fig. 1 is not upright.

GUN FIRING FROM BEHIND SLIGHT
UNDULATION.

FIG. 1. FRONT VIEW.

*W. H. Jacob, Photo, Hythe.*

FIG. 2. SIDE VIEW.

*W. H. Jacob, Photo, Hythe.*

Fig. 2 shows position of gun and Nos. 1 and 2:
The fence beyond the gun shows the slope of undulation.

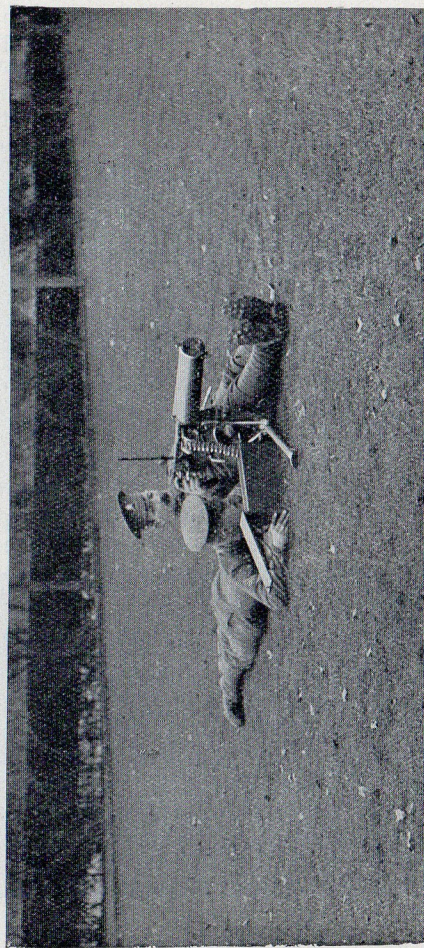
selected position. Having marked the position with a stick or stone, and having pointed it out to the numbers, the Instructor will give a definite situation and objective: also the approximate range, e.g., the enemy has been seen collecting in that farm, lay on the gate, range 900. When the situation and objective are clearly understood, the Instructor will give the order "Action." Nos. 1 and 2 will then take the tripod and gun respectively, followed by No. 3, and will place the gun in action on the marked position.

The same procedure will be followed in each of the four positions previously selected by the Instructor.

In this stage neither will the position of the limbered wagon nor the question of concealment in approaching the gun position be considered, but particular attention will be paid to the following points:

1. Correct setting up of the tripod, suitably and firmly, to obviate the necessity for re-adjustment.
2. Positions adopted by Nos. 1 and 2, so as to obtain the greatest fire effect, while offering the least vulnerable target.
3. Position of the ammunition box to ensure correct feeding.
4. Position taken up by No. 3, so as to facilitate the supply of ammunition with the least exposure.
5. That the gun is correctly "in action,"

Plate XV. FIRING ON LEVEL GROUND. TRIPOD IN LOWEST POSITION.



W. H. Jacob, Photo, Hythe.
No. 1 is less strained and can "hold" the gun better than when lying on his chest.
The back should be supported by a great coat or ammunition box.

i.e., loaded, sighted and laid, in accordance with the requirements of the situation.

All details of elementary training to be observed, e.g., cross head upright, traversing clamp tight or "sticky" as required, cork plug out.

6. That the gun is not fired to emphasize the necessity—which will frequently occur on service—of coming into action ready to seize an opportunity that may occur, but not to fire unless the situation demands it.

SECOND STAGE.

This stage will differ from the first stage only in the following respects:

The position of readiness to be not closer than about 50 yards from the gun position.

Instead of indicating the exact position on which the tripod will be set up, the Instructor will mark two points, about 20 yards apart, between which the gun will come into action. The frontages selected will exemplify the positions described in the first stage. Whenever possible, there should only be one small portion of the indicated frontage from which the objective can be seen when the gun is in action. By this means N.C. officers and men will obtain practice in selecting suitable gun positions to meet the particular requirements of the situation, and develop an eye for ground.

In this stage attention will be paid to the following points:

1. Use of ground to obtain the greatest concealment in approaching the gun position from the position of readiness. This should be kept in mind by the Instructor when selecting the positions.

2. Method of approach to the gun position as regards carrying the gun, tripod and ammunition box. Secrecy will be considered of greater importance than rapidity within reasonable limits.

3. The six points already mentioned in the first stage.

Observers should be sent out towards the direction of the objective to note visibility in the approach, when the gun is being mounted, and when in action.

THIRD STAGE.

In this stage the entire section is exercised on the same progressive system as detachments in the 1st and 2nd Stages. The actual position of each gun will be marked by the Instructor in order to bring out the handling of the Section with reference to the ground and the requirements of the situation. All the numbers will be exercised in their particular duties, and these will be changed so that each N.C. officer and man may have practice in each duty. The general situation must neces-

sarily be somewhat amplified in order to employ scouts and range-takers in a realistic manner, e.g., the enemy have been observed collecting in the copse on the left front of the infantry; the Section is covering the left flank. The guns are required to be prepared to engage the enemy should he issue from the copse; our left is not protected.

In this stage ranges will be actually taken. Whenever possible, the limbered wagon will be present or its position will be imagined, and the corporal will be in charge. Supply of ammunition will be actually carried out, e.g., boxes brought from the position or supposed position of the wagon, and empty belts will be passed back to be refilled; if the wagon is present, the belt-filling machine should be in position for use.

The points to be attended to in the 1st and 2nd Stages will be equally noted in this stage.

FOURTH STAGE.

When the first three stages have been thoroughly practised, the selection of positions and the various methods of fire suitable to particular situations will now be introduced. A situation should be carefully prepared so that, if possible, there is one particular position that is the most suitable to meet the tactical situation, while at the same time fulfilling as many of the requirements of a suitable Machine Gun position

as possible. Again, the method of fire employed should be carefully criticized, to ensure that the method most suitable to the occasion was employed, e.g., if the situation indicated traversing fire, perhaps to cover movement, concentrated fire at a particular point would obviously be inapplicable.

Opportunities should be taken during this stage for selecting and reconnoitring positions in defence. It may be assumed that the Machine Gun Sections are held in reserve, and areas should be allotted within which positions should be reconnoitred. Some of the points to be criticized in such reconnaissance would be:

(1) The exact gun positions; (2) the way to them, having regard to cover; (3) ranges; (4) Control and observation post; (5) that all information has been noted in such a manner as to be easily understood by an officer who has never seen the ground.

Again, perhaps an outpost situation may be given; lines of fire should be prepared to cover certain approaches.

In each case, guns should actually come into action on the positions selected.

N.C. officers should be practised in directing the fire in accordance with the prepared situation.

FIFTH STAGE.

This stage is an amplification of the last.

In it, surprise situations should be introduced, necessitating quick change of target or change of position to evade artillery fire.

The use of signals should also be practised both to control and regulate fire, as well as by sending out observing posts to signal results of supposed observation of fire.

Situations should be prepared which require only one gun to be in action, the other being kept in a position of readiness to meet unexpected situations or replace the other if damaged. The reserve gun must be kept in touch with the section officer, and may be ordered to come into action for a specific purpose.

SIXTH STAGE.

This is the final stage, viz., the training of the sections of a brigade in combined action. It should be carried out on a similar systematic method as the previous stages. Situations should be carefully prepared to bring out the particular principle it is desired to exemplify. Section officers should be given opportunities of handling the sections in brigade.

In all the foregoing exercises, the tactical situations should invariably be prepared by an officer and should never be left to a N.C. officer. An officer should always supervise and criticize any exercise which involves questions of tactics.

The ground should be as varied as possible, and many other positions should be practised than those mentioned, e.g., firing from ditches, use of isolated or continuous cover, methods of concealing the gun in action, and the personnel, i.e., cover from view both natural and artificial.

The points noted in the 1st and 2nd stages should be carefully attended to throughout.

It is of the greatest importance that the situations, even in the 1st stage, should be carefully prepared on the ground beforehand, in order to obtain the best results.

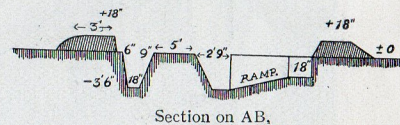
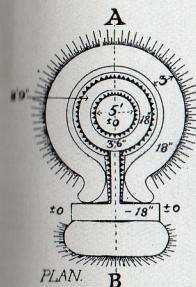
COVER AND ENTRENCHMENTS.

1. The use of cover must not be overlooked during training, for it is of great importance to machine guns, especially against artillery. Under some conditions, invisibility is of paramount importance; on other occasions, everything must give way to fire effect, and only by experience and practice at training can the relative importance of these be correctly gauged. Quick opening of fire and fire effect when required by the situation must never be sacrificed to reduction of loss by constructing cover.

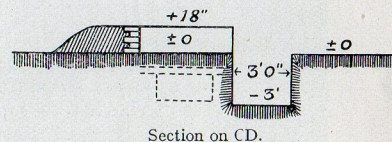
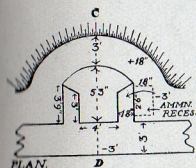
2. Machine guns require but slight cover, and this can be quickly provided by digging in easy soil.

It may sometimes be advisable to construct cover on a gun position before guns actually reach it, and only when ready would the guns be moved forward.

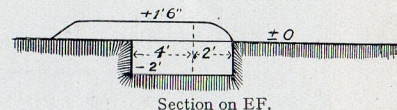
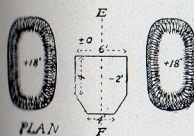
CIRCULAR MACHINE GUN PIT.



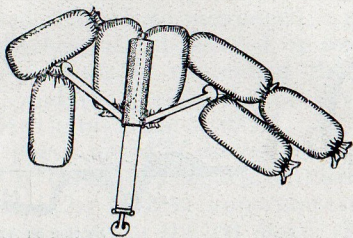
MACHINE GUN RECESS IN TRENCH.



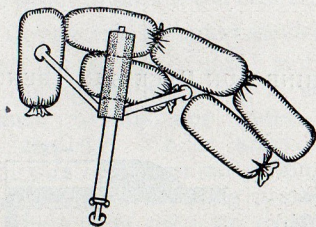
HASTY MACHINE GUN PIT.



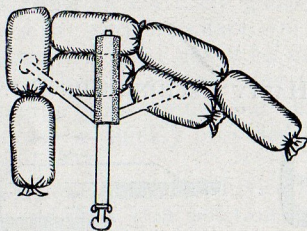
HASTY SANDBAG EMPLACEMENT FOR MACHINE GUN.



Bottom Course.



Second Course.

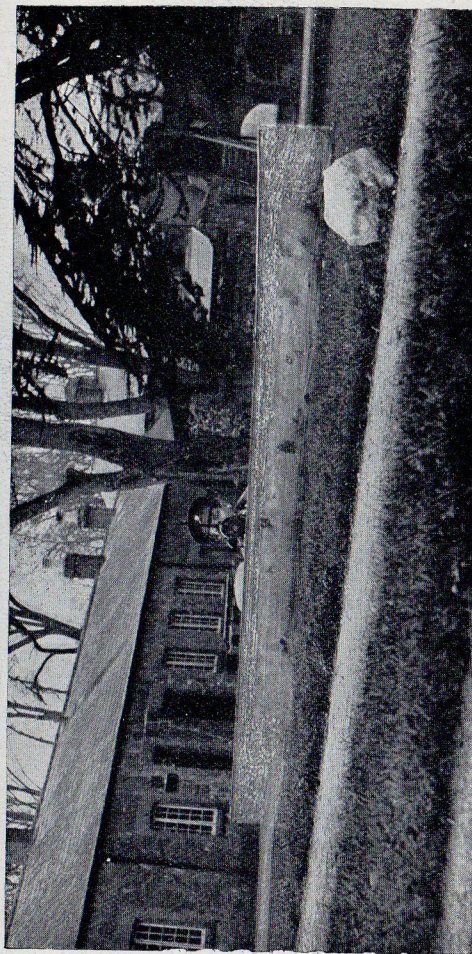


Top Course.

Total, 20 bags.

Plate XVI.

FIRING OVER CONTINUOUS COVER: LOW WALL, TREE TRUNK, ETC.



W. H. Jacob, Photo, Hythe.

Plate XVII.

FIRING FROM A CIRCULAR PLATFORM.

FIG. 1.

*W. H. Jacob, Photo, Hythe.*

FIG. 2.

*W. H. Jacob, Photo, Hythe.*

The value of this form of entrenchment is invisibility, all round traverse and good cover afforded for detachment.

Fig. 1 is the front view of the gun in action. No 2 is invisible. The gun and No. 1 offer a very small mark.

Fig. 2: View from above, showing position of tripod; as low as consistent with good shooting.

Plate XVIII.

SECTION OF MACHINE GUNS FIRING FROM
CIRCULAR PLATFORM.*W. H. Jacob, Photo, Hythe*

This form of entrenchment provides good cover for gun detachments, facilities for ammunition supply, and renders guns almost invisible at ranges beyond 800 yards.

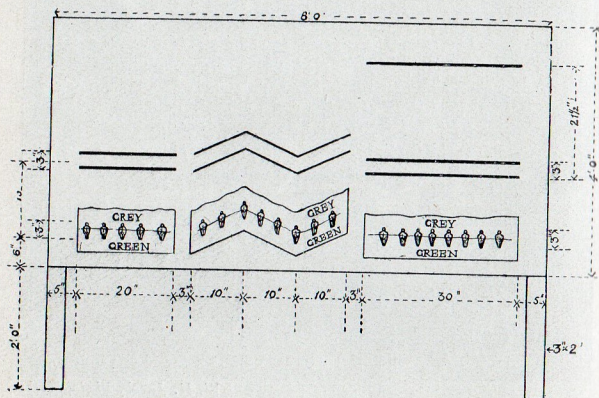
Note I.—The method of holding with the left hand, enabling the firer to elevate or depress the gun instantly on observing the effect of his fire.

Note II.—The escape of steam is liable to give the position away.

INSTRUCTIONAL TARGET FOR USE ON
25 YARDS' RANGES.

This target is of similar construction to a classification range target measuring 8 feet by 4 feet, with legs 2 feet long. The target

Plate XIX.



is faced with white paper. It is intended for use on a 30 yards' range or against the stop butt or earth bank of marker's gallery of a classification range. The target in each case must be placed 25 yards from the muzzle of the gun.

The target provides instruction in:

- (a) Horizontal Traversing.
- (b) Diagonal Traversing.
- (c) Vertical Searching.

The aiming points consist of brown full-length figures, 3 inches high and 4 inches apart centre to centre, placed on a green and grey background.

For (a) and (c) the bottom of the figures are 6 inches above the bottom of the target.

A band 3 inches wide, 20 inches long for (a) and 30 inches long for (c) is indicated by means of two black lines $\frac{1}{4}$ of an inch wide, the centre of the band being 15 inches above the feet of the figures. For (c) a third black line $\frac{1}{4}$ of an inch wide is placed 35 inches above the feet of the figures.

For (b) three lines of figures and 3 bands as in (a) but each of a horizontal width of 10 inches, will be joined together, each making an angle of 120 degrees with the next.

The bands are divided into rectangles, 2 inches wide, by vertical lines invisible at the firing point, drawn from the top to the bottom of the target.

When the target is used against a light background, brown bands may be used to enable the bullet holes to be seen more easily from the firing point.

MACHINE GUN COURSE.

TABLE "C."

GENERAL INSTRUCTIONS.

No man should begin firing with service ammunition until he has correctly passed the Tests of Elementary Training.

It is important that all the points to be observed before, during, and after firing are carefully carried out, in order to render them habitual to all machine gunners.

The section officer will fire Part I, also Practices 7 and 8, as well as the Classification Practices of Part II. Non-commissioned officers will fire all practices of both Parts.

Part I is instructional, and since it is probably the first time a new machine gunner fires with service ammunition, careful and thorough instruction is necessary throughout the practices of Part I. The trained gunner must also regard these practices as instructional. The best value will be obtained by criticizing each practice while it is in progress, ceasing fire for the purpose, rather than by waiting until it is completed, when more ammunition will probably not be available with which to correct faults.

In these Practices the firer learns, as he gains experience, to understand thoroughly the peculiarities of his gun and its mounting, and to compensate for them by suitable hold-

ing. These points can seldom be learnt without careful instruction and explanation by the section officer.

In the Traversing Practices of Part I, no tapping backwards to correct faulty traversing will be allowed. In these Practices, a space exceeding 2 inches without a bullet mark indicates faulty traversing.

The sighting elevation to be used for the instructional machine gun target is 1,100 yards. Aim taken at or in line with the feet of the figure should cause the bullets to strike in the centre of the band vertically above. Guns should, however, be harmonized before firing. As the accuracy of the first shot of each group fired by a machine gun is not reliable, a wide shot will generally be found when examining a group. Instructors should bear this in mind when criticizing the results of a practice or measuring the size of a group. In single shot traversing, therefore, the elevation may differ slightly from that required when firing groups.

Practices of Part I may be repeated as considered necessary by the section officer, provided that the rounds allotted to Parts I and III are not exceeded.

In the Classification Practices (9, 10, 11, 12) of Part II, fire will be stopped as soon as the time limit is reached. No allowance will be made in these Practices for stoppages which are due to causes other than defects of the mechanism or breakages. The firer will be

given time to look over the gun and the ammunition belt before each practice is begun.

Should the stoppage be due to a defect in the mechanism or to a breakage, sufficient time to remedy such stoppage will be allowed, or the practice will be repeated.

Points will be allotted in the Classification Practices (9, 10, 11, 12) as follows:

Practice 9.		Points.
75 per cent. of hits and over		35
60 " " less than 75 per cent.		30
45 " " " 60 " "		25
30 " " " 45 " "		15
15 " " " 30 " "		5
	Less than 15 " "	0
Practice 11.		Points.
50 per cent. of hits and over		35
40 " " and less than 50 per cent.		30
30 " " " 40 " "		25
20 " " " 30 " "		15
10 " " " 20 " "		5
	Less than 10 " "	0
Practice 10.	Practice 12.	
(Points)	(Points)	
No spaces	45	65
Not exceeding 2 spaces	40	60
" " 4 " "	30	50
" " 6 " "	15	35
" " 8 " "	5	20
" " 10 " " (exceeding 8 spaces = 0)	0	5
Exceeding 10 " "		0

CLASSIFICATION.

In order to be classified as a "1st Class" Gunner, 100 points must be obtained in the Classification Practices.

In order to be classified as a "Qualified" Gunner, 50 points must be obtained in the Classification Practices.

Those who obtain less than 50 points will be classified as "Inefficient," and should generally be replaced in the Machine Gun Section.

Part III. The ammunition allotted to this Part will be at the disposal of the section officer, and may be expended as he considers most beneficial for the efficiency of his machine gun section. No record of these rounds, other than the entry in the ammunition book, except such as are expended for extra practice of bad shots, need be kept, nor should any statement of expenditure be required.

FIELD PRACTICES.

Part IV. Tactical exercises, or problems in accordance with the principles laid down for field practices fired with the rifle, should be carried out. Most of these practices should be carried out between ranges of 600 and 1,200 yards.

ALLOTMENT OF AMMUNITION.

	Rounds.
Part I. Each officer, non-commissioned officer and man	170
Part II. Each non-commissioned officer and man	550
Section officer	350
Total	10,600
Part III. (see paragraph 648)	265
To the Commanding Officer for expenditure as he may consider advisable, such as training of drivers and horse-holders (cavalry), field practices, tests of machine guns or personnel, experimental firing, demonstrations	1,900
Training of Reserve section, Part I	2,500
To the Brigadier, for each section of the Brigade, to be expended at his discretion	2,235
Total per section	17,500

M

Ammunition allotted to machine gun sections is not to be expended for rifle firing.

TABLE "C."—SPECIAL RESERVE.

Machine gun detachments will fire Part I, Table "C" in order of practices, as far as the ammunition allotted permits.

TABLE "C."—TERRITORIAL FORCE.

Officers, non-commissioned officers, and men of the machine gun sections of the Territorial Force will fire Part I, Table "C." Surplus ammunition may be used for repetition, or for such practices of Part II as the commanding officer may consider desirable.

The annual allowances of practice ammunition for machine gun detachments allotted to armament guns of coast defence, whether abroad or at home, and whether manned by Regulars, Special and Extra Reserve, Territorial or Local Forces, and whatever their mountings, is in future to be 1,200 rounds of ball (200 rounds for each man of the detachment) and 300 rounds of blank. Each man of Regular Artillery and Infantry of the machine gun detachment detailed to armament machine guns, in addition to firing the annual course, is to be trained for at least two days with the guns that would be used on mobilization. The training of the machine gunners is not to aim at a high tactical standard so much as a thorough knowledge of the mechanism and manner of firing the weapon.

TABLE C.
MACHINE GUN COURSE (ANNUAL).
CAVALRY AND INFANTRY—REGULAR ARMY.
Part I.—Instructional.

To be fired at a range of 25 yards. Target, Instructional Machine Gun Target, Plate 35, Musketry Instruction, Part II.

No.	Nature of Practice.	Rounds.	Method of Conducting and Object of Practice.
1	Grouping	6	<i>To teach the importance of the correct holding required for the gun, which should be group in a 3-inch ring. During this practice the instructor should watch the firer so as to be able to criticize his method of holding and pressing the double button.</i>
2	Single shot Traversing	7	<i>To teach accurate laying and automatic tapping. Four figures to be indicated by the instructor. Gun to be laid on the flank figure indicated by the instructor; fire a shot and tap alternately as in Section Drill (Traversing Fire). Shots should be approximately 2 inches apart. The result of each shot should be criticized. Single shot loading. It is useful to stop the practice a few times and criticize the firer's actions.</i>
3	Application	12 (6 to each group)	<i>To teach correct laying and holding. Two alternate figures to be indicated by the instructor. A group to be applied to the rectangle above each figure. The point of mean impact of each group should be within the rectangle above each figure respectively.</i>

4	Vertical Searching	20	<i>To teach automatic manipulation of the elevating wheel.</i> Single shot loading. The gun to be laid on a figure with sights adjusted to 800 yards. Without altering the elevation of the gun, adjust the sights to 1,250 yards. Fire a shot, then elevate and fire, and continue elevating and firing alternately until the sights are again aligned on the original aiming mark. <i>Each shot should be approximately 2 inches vertically above the last.</i> Then traverse about 2 inches inwards and, without altering the elevation of the gun, adjust the sights to 800 yards and proceed as before, but depressing after each shot instead of elevating. When the sights are aligned between the figure originally laid upon and the next, the practice is completed, and each shot should be approximately 2 inches vertically below the last. The vertical interval of 2 inches at 25 yards is the horizontal equivalent to 60 yards at 1,000 yards range, or about the depth of the effective zone for the range.
5	Traversing	50	Having learned to know the holding required for the gun in Practices 1 and 3, and Practice 2 having afforded practice in automatic tapping, <i>instruction is now given in practical traversing by groups of 5-6 rounds.</i> The ammunition should not be divided in groups of 5 rounds in the belt; the gunner learns to judge the size of groups for himself. Five figures to be indicated by the instructor. Gun to be traversed from <i>right to left</i> . Groups should be evenly distributed along the band above and between the figures indicated; there should be no space exceeding 2 inches without a bullet mark.
6	Diagonal Traversing	75	<i>To teach manipulation of the elevating wheel combined with traversing.</i> Gun to be traversed from the second figure from the left to the second figure from the right of the three bands. The same principles hold good as in Practice 4. The gunner will find it useful to follow some prearranged plan in this practice, such as: "Fire," "Traverse," "Elevate"; or: "Fire," "Traverse," "Depress," each time suiting the action to the word.
Total rounds per man		170	

TABLE "C," Part II.—Classification Practices, 9, 10, 11, 12 only.

No.	Nature of Practice	Target Screen (covered with Brown paper)	Range (Yds.)	Rounds.	Time (secs.)	Remarks
7	Ranging	3' high 10' wide	400	—	—	In these practices each man has an opportunity of sighting his gun on the open range before firing the classification practices. Useful instructions in the practical method of ranging may be imparted in Practices 7 and 8. The quickest method is to fire a group, observing the strike, then elevate or depress <i>without touching the tangent sight</i> . Fire again, and turn elevating wheel until nucleus of fire falls on the target. Now the slide should be adjusted <i>without touching the wheel</i> and the aim shows the sighting required to hit the target.
8	Ranging	"	600	(50)	—	
9	Application Traversing	3' high 30' wide	400 400	50 100	20 50	Gun to be traversed from <i>right to left</i> . The firer is required to traverse the target with the rounds allotted within the time limit without restrictions.
10	Application	3' high 30' wide	600	50	20	Gun to be traversed from <i>left to right</i> under the same conditions as in Practice 10.
11	Traversing	3' high 30' wide	600	100	50	Range known approximately. If it is probable that the firer can himself observe, he should apply his fire from such observation. The remainder of the section, except a No. 2 to assist the firer, should form two groups under the sergeant and corporal respectively. These groups should observe the fire by eye or with field glasses from the flanks. Each N.C.O. and man should note down the result of his observation of each group fired, and at the end of the practice put
12	Observation	3' high 10' wide	900 100 1200	100	++	

against each note of his observation the semaphore signal he would have sent had he been required to signal results. If the firer is unable to obtain observation himself, another No., not the No. 2 at the time, will control the fire from observation with field glasses, the remainder observing from a flank as described above. After each firer has completed the practice, the section officer will criticize the results of the observation as regards methods followed by firer and observers. During this practice the belts may be prepared with artificial stoppages placed after every 20 or 30 rounds in the belt. The time and method required to remedy them should be noted and criticized.

Ranges known approximately. Nos. 1, 2 and 3 will fall in with the gun, tripod and ammunition box, as for the 1st Test of Elementary Training, about 100 yards in rear of first fire position, which will be approximately 800 yards from the targets. The section officer will mark the first and subsequent fire positions, and, on his signal, the gun, etc., will be carried forward at a steady double, and fire opened without further orders. The gun will be carried dismounted, and the tripod legs will be closed and clamped until the fire position is reached. Fire will be continued at each position until a hit is obtained. Sights will not be adjusted until the new position is reached. *At alternate fire positions the firer will adopt the prone position when firing. The objects of this practice are to emphasize the lessons of elementary training as regards quick and correct mounting of the gun and quick opening of fire, and also to exemplify the principle of maintaining fire until effect is obtained.* It is often desirable to time the practice or a portion of it. If the section officer decides to do so, the time should be taken until a hit is obtained—not merely until fire is opened, because this encourages men to open fire without accurate laying. The advance to a fire position should not be a race between detachments if both are carrying out the practice simultaneously, nor against time.

Fire from successive positions	15 iron falling plates on a frontage of 30 feet	800 400	100
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* According to range facilities, nature of ground and climatic conditions.
 ** No limit, but at a rate of at least 250 rounds a minute.

CHARACTERISTICS OF THE MACHINE GUN.

1. A thorough knowledge of the characteristics of the machine gun is essential, for upon those characteristics is based the tactical employment of the gun.

2. The characteristics, and their effect on the tactical employment of the machine gun, are as follows:

I. FIXED PLATFORM.

Three important conclusions follow from this characteristic:

(1) The personal factor is reduced. (2) The reduction of the personal factor, combined with the fixed platform, result in the close grouping of machine gun fire. (3) Suitable for night firing.

From these conclusions the following deductions may be drawn regarding their effect on tactical employment:

(1) By reducing the personal factor, approximately the same results can be obtained in war as in peace. This also renders the machine gun particularly valuable in the crisis of a fight.

(2) The close grouping of fire causes a very restricted area of ground to be beaten; this is less than half the area beaten by rifle fire.

The following table gives a useful indication of the size of the cones of 75 % and 100 % of the bullets fired at various ranges in their flight. The bullets would actually take the form of an ellipse, but for convenience only the longest, i.e., the vertical diameter, is given:

Range. (Yds.)	Vertical diameter of		
	75 % cone.	100 % cone.	
500	5' 0"	16' 0"	The height of the centre of the cone above the ground at each range is slightly more than those given for the rifle in the Trajectory Tables, Musketry Regulations, p. 47.
1,000	10' 0"	25' 0"	
1,500	15' 0"	40' 0"	

This close grouping, and therefore highly concentrated fire, is particularly suitable for surprise effect, and in addition not only facilitates observation of fire, but renders such observation reliable.

Another advantage of close grouping is the safety with which fire can be directed, under certain limitations, over the heads of other troops to support their advance or increase the volume of fire.

There is, however, another aspect which is actually a disadvantage, for, owing to the close grouping of the fire, narrow or widely scattered objects, such as a machine gun or extended infantry, offer unsuitable target;

while, unless the range can be accurately ascertained, or the target has considerable depth, effect can only be ensured by the employment of several guns and by skilful fire direction.

(3) Lines of fire can be prepared by day for firing at night.

II. RAPID PRODUCTION AND APPLICATION OF LARGE VOLUME OF ACCURATE FIRE.

When the gun is loaded and laid, fire can be opened instantaneously at any moment. This is particularly valuable on outpost, or for night firing, for the gun can command any required locality for any length of time, and the double button only requires to be pressed to produce and apply a large volume of accurate fire at the moment it is required.

As regards the indication of the point of aim, greater accuracy is ensured than is the case with an equivalent volume produced by rifle fire, because with the machine gun the point of aim has only to be recognized by one man, or it will frequently be possible for the machine gun officer to lay the gun himself, or for the firer to take the point of aim from another gun already laid.

III. NARROW FRONT AND SHALLOW DEPTH FROM WHICH A LARGE VOLUME OF FIRE CAN BE DELIVERED.

A machine gun occupies the same frontage as two men with rifles. If the normal rate

of machine gun fire is taken as 300 rounds a minute, and the average rate of rifle fire at 12 rounds a minute, it is apparent that the volume produced by the machine gun is more than 12 times that of two men armed with rifles. This indicates the value of the machine gun in cramped localities where it is not possible to deploy a number of rifles, such as villages, roads, or defiles. Also as a flank defence to enfilade hedges, walls, or obstacles.

These characteristics, while enabling the gun to take advantage of small or isolated cover, also renders it not only difficult to locate but difficult to range upon as, with so small and isolated a target, great accuracy in ranging is essential.

IV. ALL-ROUND TRAVERSE.

The chief value of the all-round traverse lies in the facility with which the gun can be turned in any direction without moving the tripod, and with the minimum of movement or exposure. This facility, combined with the characteristic of narrow frontage and shallow depth, enables the machine gun to at once engage an enemy advancing from an unexpected direction without increasing its vulnerability to enfilade fire. This power of all-round traverse indicates action on a flank or in a detached post, as particularly suited to the machine gun. It also renders the gun

a useful auxiliary to rifle fire in engaging an enveloping attack by mounted or other troops.

V. INVULNERABILITY.

Only two men are required to serve the gun, but they must be well trained. The gun cannot be easily put out of action provided there are sufficient trained men to replace casualties.

VI. MOBILITY.

A machine gun with tripod mounting can be taken wherever a man on foot can go; the gun can thus be employed to closely support infantry in any nature of country, and in close country will often take the place of artillery, when the ranging power and mobility of this arm can no longer be used for close support. By mounting a few men on the limbered wagons, the guns can be rapidly moved from place to place to meet unexpected or critical situations. For this purpose, machine guns may often be retained as a mobile reserve of fire under the hand of the commander, particularly in defence.

VII. ACCIDENTAL CESSATION OF FIRE.

Consisting as it does of delicate mechanism, the fact must be accepted that the machine gun will stop firing from time to time and will thus fail to meet the requirements of the situation. Such cessations of fire may be

due to want of care—which is avoidable; or due to mechanical causes—which are unavoidable and liable to occur in any piece of mechanism. Both can be overcome by careful training of the detachment; in the former case by care and examination of gun and ammunition; in the latter, by skill in remedying the cause of cessation. In addition, a large expenditure of ammunition, of which the gun is capable, brings a considerable strain on the mechanism, and this, combined with the probability of accidental cessations of fire, renders the gun *unsuited to prolonged firing*. Fire should therefore be reserved for *suitable targets*, having due regard to the tactical requirements, and for *decisive action*.

VIII. NOISE OF FIRING, AND STEAM.

The peculiar noise of the automatic firing attracts attention towards the gun, and, when steam is given off owing to the water in the barrel casing boiling, the position of the gun can be readily located. This indicates skilful use of cover in order to conceal the gun position, and the reconnaissance of alternative positions.

3. The above characteristics may be briefly summed up as follows:

THE MACHINE GUN IS A WEAPON OF OPPORTUNITY, PARTICULARLY ADAPTED FOR SURPRISE EFFECT BUT NOT FOR SUSTAINED FIRE ACTION.

FIRE DIRECTION.

1. The general principles of rifle fire explained in Musketry Regulations, Chapter 3, apply to machine guns, though they require to be modified in detail. Machine gun fire should be regarded as a special form of collective fire.

2. Owing to the barrel of the machine gun being supported in a different manner to that of the rifle, and consequently the jump being different, the trajectory tables require slight modification, though those given in the Musketry Regulations for the rifle are sufficiently correct for practical use.

3. The dispersion in area of machine gun fire is less than half that of rifle fire under peace conditions.

4. Owing to the closeness of grouping and rapidity of fire, observation is facilitated; furthermore, as wild shots do not occur, one of the main causes of error in observing rifle fire is eliminated; if any shots are observed, it is safe to conclude that the remainder are *vertically* close to those observed. The machine gun groups are easily distinguished from rifle fire by the even, successive, and continuous character of the hits; consequently up to the limit of easy observation (800 yards) in favourable ground, the fact that ranges are unknown will not affect machine guns to the same extent as rifles, as correct observation will probably be obtained at once.

5. The guiding principle of machine gun fire, which is based upon the characteristics of the weapon, is that the fire is produced and applied in groups. The number of rounds comprising a group varies within certain limits, according to the requirements of the situation.

6. The following methods will be used:

(a) *Ranging Fire.* The bursts of fire will be limited to from 10 to 20 rounds. The object of this method is to obtain observation and so correct any errors in sighting. Under favourable conditions for observation, such as dry earth, sand, etc., a burst of 10 rounds should be sufficient to give observation. Under less favourable conditions, up to 20 rounds in a burst may be necessary. It should be noted that, considering the close grouping of the fire, unless observation is obtained with bursts of 20 rounds, *it is unlikely that observation will be obtained with larger bursts.*

(b) *Rapid Fire.* This is used when the greatest volume of fire is required. It is produced and applied by means of a series of long groups of 30 to 50 rounds. The firer pauses momentarily between each group to ensure that the sights are correctly aligned, and continues until ordered to cease, or until he considers it necessary to do so. Rapid fire will be used (1) when the sighting elevation has been successfully obtained by rang-

ing fire; (2) when surprise effect is required; (3) with combined sights.

(c) *Traversing Fire.* This method of distributing fire laterally is employed against a linear target and is applied by means of a series of small groups with the object of covering as wide a front as possible with only sufficient volume to ensure effect. In this case a group should consist of from 5 to 10 rounds only, because against a linear target greater volume will not produce greater effect.

Up to 1,000 yards, experiments show that machine guns firing 250 rounds in one minute can distribute annihilating fire (i.e. without any lateral gaps greater than 1' 6" between shots) over 25 yards of front. This will form the basis of calculations as to whether any particular line is sufficiently dense to repay the expenditure on it as regards material effect, and apart from any tactical necessity there may be to engage it. This is also the basis for calculating the number of guns required to defend any frontage, or to engage any target in a given time.

Machine guns can engage lines to greater advantage from an oblique direction, as the spaces between figures are closed up the further to a flank the gun position may be. At an angle of 45 deg., experiments show that increase in effect of at least 30 per cent. may be expected.

(d) Single, deliberate shots are of no

value for ranging, as, owing to the gun then being perfectly steady, these shots bear no relation to the subsequent rapid grouping. The same generally applies to the first shot of every group.

7. From the foregoing paragraphs it will be seen that fire direction may be divided into two main headings:

(i) Allowance for error of day.

(ii) Allowance for error in ranging by artificial dispersion in depth.

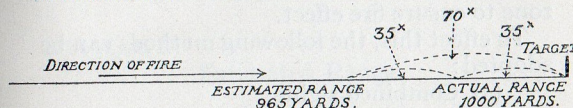
8. Allowance for error of day is dealt with in Musketry Regulations, Chapter III, Sections 28-30.

9. Allowance for error in ranging by artificial dispersion in depth. Owing to probable errors in ranging, difficulty in estimating the error of the day at long ranges, and to the close grouping of the machine gun, it becomes necessary to increase the depth of the beaten zone to give assurance of obtaining fire effect. The amount by which the beaten zone has to be increased depends on (i) the permissible error in ranging, and (ii) the probable error in ranging.

As regards (i) it will be clear from the diagram below that if we make an error in ranging which is greater than half the depth of the effective zone, the target will not be included in this zone, and fire will be ineffective. For example, if the correct range to the target is 1,000 yards, but is estimated to be 965 yards, the furthest shots

of the effective zone (with Mark VI ammunition) will theoretically just strike the target (Diagram A). If the range were estimated at 950 yards, the furthest shots would strike 15 yards short of the target.

DIAGRAM A.



It is clear, therefore, that the permissible error for ranges of and beyond 1,000 yards with Mark VI ammunition is as follows:

1,000 yards	35 yards.
1,500 "	30 "
2,000 "	25 "

As regards (ii), the probable error depends on the means we have at our disposal for obtaining the range. These may be divided into four heads, and the probable error with each is as follows:

- Direct ranging with Mekometer, 5 %.
- Direct ranging with Marindin, 3 %.
- Judging distance by eye, 15 %.
- Judging distance by eye with assistance of key ranges, 10 %.

From this it is seen that if the range to a target is given by each of the above means to be 1,000 yards, the probable error will be,

with: (a) 50 yards; (b) 30 yards; (c) 150 yards; (d) 100 yards, and in each case it may be either over or under the estimated range.

Considering both the permissible and the probable error together, it is seen that in practically all cases it is necessary to considerably increase the depth of the effective zone to ensure fire effect.

To effect this, the following methods can be adopted:

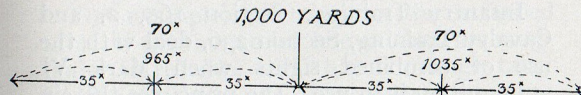
- (a) Combined sights.
- (b) Bracketing, i.e., converging elevations.
- (c) Vertical searching.

10. *Combined sights.* When two or more guns are working together, the depth of the effective zone can be increased by ordering different elevations to be used by each gun, while each uses the same aiming mark. By this means, while the effective zone is increased, the density of fire is considerably reduced. The extreme difference between the sighting which will ensure that no gaps are left between the cones of the different guns is the depth of the effective zone for the range. If, therefore, when firing at 1,000 yards with Mark VI ammunition, one gun fires with elevation 1,035, and the other with 965, the cones will theoretically just join at the 1,000 yards point (Diagram B). The density of the fire will be very much less, however, between 990 and 1,010 yards than at 965 and 1,035,

at which ranges the nuclei of the different cones will fall, and in order to give an even density to the combined effective zone, it is necessary to make the two cones slightly overlap. The greatest difference that can be allowed between guns is therefore only 50 yards (Diagram C).

DIAGRAM B.

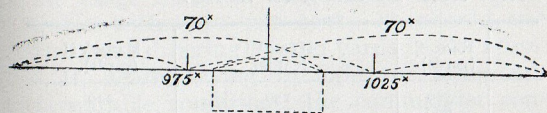
Estimated Range.



Reduced Density of combined cone over 20 yds.

DIAGRAM C.

Overlap of 2 Cones at 20 yards.



The difference of sighting used depends on the number of guns available and also the probable error in ranging. In order to find the depth of the combined effective zone, the following method is useful:

Multiply the number of guns available less 1, by the difference in sighting used, and add the effective zone of one gun, e.g., To

find the depth of combined effective zone at 1,000 yards when four guns are available and 50 yards' difference used:

$$(4-1) \times 50 + 70 = 220 \text{ yards.}$$

Since the greater the concentration of fire the greater will the effect of fire be; therefore combined sights should not be used—or with small differences only—if accurate observation of the strike of the bullets can be obtained, unless surprise is required.

Infantry Training, Section 165, 2, and Cavalry Training, Section 236, deal with the use of combined sights when Mark VI ammunition is in use. The principles therein mentioned require some modification when Mark VII ammunition is used, otherwise there will be a considerable waste both of power and of effect.

The respective depths of the effective zones may be taken as being:

RANGE (yards).	MARK VI (yards).	MARK VII (yards).
500	150	220
600	134	204
700	118	188
800	102	172
1,000	70	140
1,200	66	112
1,500	60	70

From this it is apparent that, allowing an error of 10 per cent. in ascertaining the range, the flatness of trajectory within 800 yards will ensure the target being included

in the effective zone. Therefore with Mark VII ammunition, combined sights should not be used within 800 yards.

The Table on page 183 shows how dependent successful fire action is upon the degree of accuracy with which the range to the target is obtained. It therefore appears necessary to allow greater latitude to machine gun commanders when using Mark VII ammunition than is contemplated in the existing regulations.

For example, referring to the attached table, if a commander knows that his range finder is reliable, and that his range taker is efficient, he could count on an error not exceeding 5 per cent.; if, then, the range was given as 1,000 yards, he could safely use one elevation and not be obliged to resort to combined sights to secure effect. If, however, he had to judge the range, or appraised his range finder or range taker as only reliable within 10 per cent., he should use two guns differing by 100 yards in elevation.

If, again, owing to light, or other unfavourable conditions, the commander considered his estimate of the range to be only within 15 per cent., he would require three guns differing by 100 yards. He would probably not open fire with two guns, as success would be exceedingly doubtful, unless required to do so by the exigencies of the situation.

It may be stated for general guidance

that when using Mark VII ammunition, combined sights differing by 100 yards should be used beyond 800 yards and up to 1,200 yards inclusive; beyond 1,200 yards the difference in sighting should not exceed 50 yards between guns. As will be seen from the attached table, if this guiding principle is followed successful fire action can be relied upon. Under certain conditions, however, as explained above, a machine gun commander should use his judgment in modifying the application of this principle in accordance with the facilities that may be available for accurate ranging, and thus gain the tactical end in view with less expenditure of ammunition and less exposure of guns and personnel.

Another question which should be left to the judgment of the machine gun commander occurs when sections are brigaded. In such a case differences of elevation may be given either to each gun or to each section. This will depend on the tactical situation. For example, if three sections are co-operating and the commander judges that ranging can be relied upon to give an error not exceeding 10 per cent., and the range is given as 1,200 yards, he could either order each section to use the same elevation and the difference between sections to be 100 yards or he could order three guns each to take an elevation differing by 100 yards.

TABLE SHOWING THE EFFECT OF COMBINED SIGHTS, AND ILLUSTRATING THE SAVING OF FIRE POWER AS ACCURACY IN RANGING INCREASES:

Range in Yards.	Depth of Effective Zone in yards.	Mark of Ammunition.	Error in Ranging.	Consequent Depth to be searched in yards.	Using Combined Sights.			Distance over which Cones Overlap.
					Minimum Number of Guns Required.	Difference in Sighting Elevation in yards.	Depth Searched in yards.	
1,000	140	VII	5% 10% 15% 5%	100 200 300 100	2 *2 3 †2	100 50 100 50	240 190 340 120	40 90 20 20
1,200	112	VII	5% 10% 15% 5%	120 240 360 120	2 3 4 †2	100 50 100 50	212 162 312 412	12 62 16 16
1,500	70	VII	5% 10% 15% 5%	150 300 450 150	†- 3 6 *8	100 50 50 50	170 120 320 420	20 20 30 30

* In these cases another gun would be required, as the depth is insufficient for assurance of effect with number of guns given.

† In these cases 100 yards' difference of elevation between guns is too much, for a space would be left between the cones within which the target might be, and would consequently be struck only by the few bullets outside the 75 %, i.e., the effective zone.

The former would be used against a very favourable target, which required a large volume; the latter when the volume produced by three guns would meet the tactical requirements, in which case one section and one gun would be held in reserve. This would be in accordance with the principles laid down in Infantry Training, Section 162, 12.

12. *Control of guns when using combined sights.* In order to obviate the need of long fire orders, it is only necessary for machine gun officers to give out the highest range to be used. This will always be taken by the right hand gun of the section or battery as the case may be. The No. 1 of that gun will pass to the No. 1 of the gun on his left the range he *himself* is using. This No. 1 in his turn will pass on his range to the gun on his left, and so on down the line. In addition, the directing officer must state the difference in sighting between guns to be used, which will also be passed down by Nos. 1.

When the target to be engaged is a narrow one, and all guns are using the same aiming mark, it will be generally impossible for the firers to observe their own particular cone of fire as distinct from the whole combined cone. Under these circumstances no alteration in sighting is permissible except under the orders of the directing officer.

In cases, however, in which the target to be engaged is a broad one, different points

of aim, corresponding to their own position in section or battery, can be given to each gun or section, and in this case each firer should endeavour to correct his elevation from observation of the bullet strike. In addition, traversing fire from the flanks inwards should be ordered, and converging cones of fire will be obtained, producing greater moral and material effect.

If, after fire has been opened, the directing officer wishes to alter the sighting used in accordance with his observation, or for other reasons, the quickest method is to bring the elevation of his left hand gun above that of the right hand gun, or vice versa, according as to whether he wishes to increase or decrease the elevation originally used. For example:

With two guns, using combined sights at 1,000 yards, the original elevations would probably be 975 and 1,025 yards. In order to increase the elevation of these combined sights by 50 yards, he would give the order, "Left Gun up 100." This would then leave the guns firing with, left gun 1075, right gun 1,025 yards. The amount necessary to bring the highest or lowest gun's elevation the correct amount below or above the remaining guns respectively, is to multiply the difference in sighting between guns by the number of guns used, e.g., 4 guns, 50 yards difference; amount necessary, 200 yards.

If the directing officer is directing the fire from the opposite flank to that of the gun or guns whose elevation he wishes to alter, it may be necessary to cease fire momentarily for his order to be received, after which he will immediately give the signal to continue. This will in many cases not be necessary when he is on the same flank.

13. *Bracketing, or Converging Elevations.*

When only a section is available, and it is found that sufficient assurance of fire effect is not given by the normal method of combined sights, bracketing, or converging elevations should be used. The method in which it is carried out is as follows:

The range is estimated by eye alone, or in conjunction with key ranges; the probable error is then determined, and also the limits between which it is found necessary to search with fire in order to ensure fire effect. If, for example, the range is estimated by eye to be 1,000 yards, it is probable that the target is somewhere between 1,150 and 850, or if with the aid of key ranges, between 1,100 and 900. These elevations (when using Mark VI ammunition) are allotted to the right and left guns respectively, who fire a burst, then work *inwards* by altering their respective elevations by 50 yards at a time, eventually passing each other. If, during the fire, observation of the bullet strike can be obtained, fire should immedi-

ately be ordered with the correct elevation. When using Mark VII ammunition, however, this method would not be necessary at 1,000 yards with a 10 per cent. error, as combined sights would ensure the necessary amount of ground being swept. The elevations with above mark of ammunition when using Bracketing Fire will be altered by a 100 yards instead of 50^s. This method is rather slow and expends a large amount of ammunition, but the moral effect will be considerable, as the enemy will have to pass through the zone of fire of one or other of the guns. Should the nature of the target render it advisable, traversing fire can be used in conjunction with bracketing.

14. *Vertical Searching.* This method will be seldom used on service, except when a section only is available, and it is required to engage a target in enfilade, such as a road running towards the gun position along which the enemy is extended, a trench or hedge parallel to the line of fire. It is very slow, requires a large amount of ammunition, and even with very highly skilled firers it is very difficult to avoid gaps between bursts.

The range to the nearest point of the target is taken, sights adjusted, and gun laid on that point. Sights are then set for the furthest point of the target to be engaged. This will then throw the line of sight short

of the aiming point. A burst is then fired, elevating wheel is then turned sufficiently to cause the next burst to strike beyond the first, but not so far as to allow a gap or defiladed zone between the two bursts.

This process is continued until the line of sight is again brought on to the aiming mark. The whole length between the near and far end of the target will then have been swept.

If the target is broader than the breadth of the normal cone of fire for that range, the gun should then be slightly traversed and process reversed. The slide will in this case be brought back again to the distance of the near point of target; the line of sight will then be above aiming mark, and the elevating wheel will be turned until the line of sight is again on the aiming mark.

15. In the following paras., dealing with overhead, indirect, and night fire, are exemplified the application of the methods of fire referred to in para. 7, to particular tactical situations. These examples must be studied and practised in peace, as skilful preparation and direction are necessary if adequate results are to be obtained on service.

16. *Overhead Fire.* Owing to the fixed platform and close grouping of machine gun fire, this method may be used with safety, under limited conditions.

The state of the barrel, the condition of the tripod, and the nature of the ground on which it is erected, the visibility of the

target, accuracy of aim, holding of the gun, and the probable errors in ranging, are all factors which increase the difficulty and risk of employing overhead fire, and necessitate a reasonable margin of safety.

The flat trajectory necessarily restricts overhead fire at the closer ranges if the gun position, friendly troops and the enemy are on the same plane, while at long ranges the dispersion of the cone of fire and difficulty of ranging makes it dangerous.

Overhead fire, therefore, might normally be employed under the following conditions:

(a) Only "from" or "at" a commanding position, or across a valley; but *not* when the gun, friendly troops and target are on the same plane.

(b) The range to the target must be obtained accurately, that is, within 5 per cent. of error.

(c) If the range is 1,000 yards or under and the angles of sight to the target and friendly troops contain an angle of not less than 28 minutes.

If the range is between 1,000 and 1,500 yards, the angle must not be less than 53 minutes.

These angles allow for a large margin of safety at the shorter, and a sufficient margin at the longer, ranges.

If the range is over 1,500 yards overhead fire should not be used.

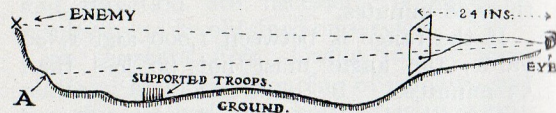
The safety angles mentioned above may be obtained:

(a) From prismatic field glasses grati-culed for Mark VII ammunition, in which case the distance between the 1,200 yards and 1,400 yards graticules gives an angle of 28 minutes, and that between 1,000 yards and 1,400 yards an angle of 53 minutes.

(b) By the card and string method. Attach a piece of string of any convenient length—but the longer the better and not less than 24 inches—to a card.

If the string is 24 inches long the angles required, viz., 28 and 53 minutes, are equivalent to the distance between lines drawn on the card 19-inch and 37-inch apart respectively.

By holding the card, on which these lines are drawn, vertically and 24 inches from the eye the spaces between the lines will give the required safety angles, e.g.:



In this diagram the range to the enemy is between 1,000 yards and 1,500 yards,

consequently the safety angle of 53 minutes is taken. It is therefore safe to fire over the supported troops until they reach A.

17. *Indirect Fire.* Owing to the fixed mounting of the machine gun, indirect fire can be used to cover areas of ground, sweep roads, etc. Apart from the fact that fire direction is facilitated when firing unexposed to aimed rifle fire, the advantage of being concealed from the enemy's artillery must not be overlooked.

By means of graticules cut across the focal plane of a pair of prismatic field glasses, indirect fire can be as commonly used and as quickly applied as ordinary direct fire.

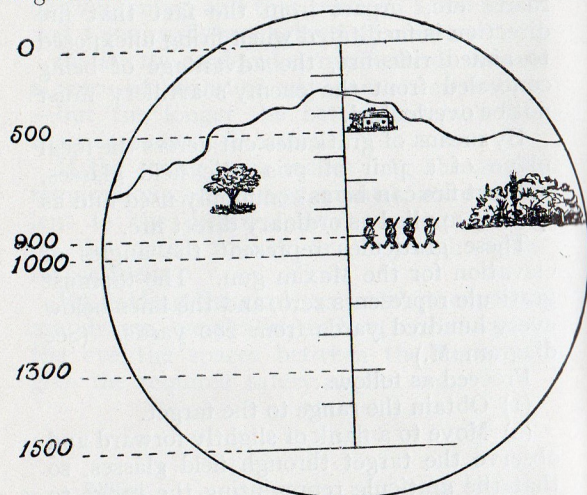
These graticules represent the angles of elevation for the Maxim gun. The topmost graticule represents zero, and the lines below every hundred yards from 200 yards. (See diagram M.)

Proceed as follows:

- (1) Obtain the range to the target.
- (2) Move to a flank or slightly forward and observe the target through field glasses, so that the graticule representing the range to the target falls across the target, *vide* Diagram M, e.g., 900 yards to target, and then see which line cuts a suitable aiming mark above the target which can be seen from the gun position, e.g., house 500 yards graticule. The range corresponding to that line, namely, 500 yards, is the tangent elevation at which to open fire, using the house as an aiming

mark, if it is required to strike the target. By this method very great accuracy can be obtained, and indirect fire opened as easily and quickly as direct.

The angles of elevation may be put in Diagram M.



graticule form on a visiting card, but it must be understood that such methods are less accurate than graticules cut on field glasses. The graticule card enclosed in the pocket of this book has been used with striking success in the hands of experts. A notch was cut in a stick which was held to the shoulder to ensure the card being exactly 18 inches from the eye.

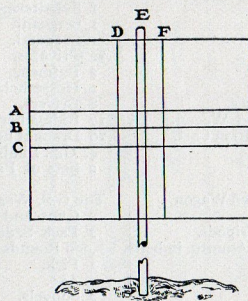
18. *Night Firing*.—If the gun position is not exposed to the enemy's fire, the gun, if not otherwise required, can be mounted and laid by day, and left till night.

A stick is placed in the ground 10 yards in front of the gun in a direct line with the target.

At *night* this stick is replaced by a lamp, and the sight altered (but not the gun) until the sights are aligned on the lamp. This ensures accurate re-laying should the gun shake off during firing.

In order to align the sights on a light, it is necessary that a beam 9 inches broad at 10 yards be used. Diagram P shows the form of front for the lamp, which allows of searching within definite limits by means of auxiliary aiming marks.

DIAGRAM P.



Bands A, B, C, D, F are $\frac{1}{3}$ inch wide.

The tangent sight slide should be adjusted so that the line of sight is directed at the intersection of the lines B E. The lines A C are respectively $\frac{3}{4}$ inch above and below line B; if the lantern is placed 10 yards away from the gun, these lines will give a difference of angle of $7\frac{1}{2}$ minutes from the normal line B. The amount that $7\frac{1}{2}$ minutes represents in range can be calculated from the tables of elevation. The firer can be ordered to concentrate by firing with the original laying or to search within definite limits by varying his aim from line A to line C.

Deflection can also be ordered by means of the lines D and F, which are $2\frac{1}{2}$ inches from the centre line, giving therefore a deflection of about 2 feet per 100 yards.

WAR ESTABLISHMENTS.

Infantry.

- 2 Guns.
- 1 Subaltern.
- 1 Sergeant.
- 1 Corporal.
- 12 Privates.
- 2 Drivers.
- 1 Riding horse.
- 4 Draught horses.
- 1 G.S. Limbered Wagon.
- 1 S.A. Ammunition Cart.

The G.S. Limbered Wagon contains:

- 2 Guns with Tripods.
- 7,000 Rounds of Amtn. in belts.
- 1 Pick.
- 1 Axe.
- 1 Billhook.
- 2 Shovels.
- 20 Sandbags.

Cavalry.

- 2 Guns.
- 1 Subaltern.
- 1 Sergeant.
- 1 Corporal.
- 12 Privates.
- 2 Batmen.
- 2 Horse-holders.
- 8 Drivers.
- 17 Riding horses.
- 16 Draught horses.
- 4 G.S. Limbered Wagons.
- 2 Sets of Pack Saddlery.

The G.S. Wagons contain:

- 2 Guns and tripods.
- 2 Pack Saddlery.
- 7,000 Rounds Ammunition.
- 1 Pick.
- 1 Axe.
- 2 Shovels.
- 1 Billhook.
- 20 Sandbags.
- 2 Wagons—16,000 Rounds as Regimental Reserve.

AMMUNITION SUPPLY.

Approximate No. of Rounds provided in the Field for each Machine Gun.

For each Machine Gun of —	With Units.		Total with Units.	With Brigade Ammunition Column.	Ammunition Park.	With Divisional Ammunition Column.	Lines of Communication.	Total Rounds Per Gun in Front of Advanced Depot.
	On Wagon in Belts.	Regimental Reserve.						
Cavalry or Mounted Infantry	3,500	16,000	19,500	10,000	6,000	—	14,000	49,500
Infantry	3,500	8,000	11,500	5,000	6,000	5,000	14,000	41,500

For allotment of ammunition for peace training, see page 161.

APPLICATION OF PRINCIPLES TO THE ORGANIZATION AND TACTICAL HANDLING OF INFANTRY MACHINE GUNS.

1. Machine guns are organized in sections, which form an integral part of the battalions to which they belong. But as circumstances may make it advisable to employ several sections together, a brigade commander may, if he so desires, detach two or more machine gun sections temporarily from their battalions and place them under the brigade machine gun officer (see page 205) for employment as a unit of the brigade.

2. When employed by sections with their battalions, machine guns are usually better able to take advantage of fleeting opportunities to support infantry closely, and are more easily concealed both on the move and in action than when brigaded.

On the other hand, a single section of these guns cannot be relied upon to obtain results proportionate to the expenditure of ammunition when first opening fire, at distances beyond about 1,200 yards. Further, it is rarely possible to arrange that sections acting independently shall co-operate effectively with each other.

Machine Guns Brigaded.

3. By employing several sections under the control of one commander, a brigade com-

mander is able to keep a powerful reserve of fire in hand to be used for any special purpose, the probability of obtaining good effect at ranges beyond 1,200 yards is increased, and it is easier to ensure that the fire is directed on the objective desired by the brigade commander.

4. The disadvantages of brigading machine guns are:

(i) That the difficulties of concealment are increased.

(ii) That at shorter ranges than 1,000 yards the control of more than one section usually becomes difficult, more especially in attack.

(iii) That the positions suitable for a number of sections in attack are often difficult to find at effective and close ranges, and that the combined movement of a number of sections is only possible under such conditions when the ground is very favourable.

5. It will, therefore, usually depend upon the general situation and upon the ground whether the machine guns should be placed under the control of the brigade machine gun officer, or left with the battalions to which they belong.

Position of Machine Guns in Attack.

6. In attack, when the facilities for concealment and control at effective range are good, good results may be obtained by unity of command, and, by a timely concentration

of fire, machine guns may be an important factor in the struggle for superiority of fire.

When control and concealment are difficult, or when the brigade is extended over a wide front, it will usually be better to leave guns with their units.

It will often be advisable to employ both methods and to leave their machine guns with the battalions which are first extended, while those of reserve battalions are placed under the command of the brigade machine gun officer.

7. Machine guns should rarely attempt to move forward with attacking infantry beyond a certain point. When they have gained a position from which they can effectively support their infantry in the struggle for fire superiority and in the assault, they should only be moved for good and sufficient reasons. The difficulties of ranging and of concealment on the move usually outweigh the advantages of decreasing the range.

8. Machine guns will usually find opportunities for employment in the attack, in assisting the advance of their infantry by means of covering fire, in protecting attacking infantry against counter-attack or against cavalry, in covering an exposed flank, in assisting the infantry in the fire fight, in preparing for the assault by sudden bursts of fire against the objective of the attack, and in assisting to secure localities seized during the advance. After a successful assault

machine guns should reach the captured position as soon as possible, in order to pursue the enemy with fire and cover the reorganization of their infantry.

Use of Machine Guns in Defence.

9. In defence machine guns permanently allotted to the defensive line may lose their mobility, and can rarely be used as a reserve of fire for special purposes, since it is not possible to foresee the action of the enemy when allotting them to their positions. For these reasons it should be exceptional to employ more than a limited number of guns with the firing line in a defensive position.

When so employed, machine guns may be used either dispersed, or brigaded to command approaches, defiles, exits from woods, etc., and to bring fire to bear upon the ground in front of weak parts of the position.

10. When brigaded as part of a local reserve, machine guns retain their mobility and are therefore available to meet any unexpected situation, or to support local counter-attacks closely.

In order to make full use of the guns, alternative positions should be allotted to sections. These positions should be thoroughly reconnoitred and all necessary arrangements made for rapid occupation and quick opening of fire.

These arrangements should include: Previous preparation of cover, information as

to the shortest route to the various positions, preparation of range cards, and selection of the most suitable position from which to control and observe fire.

Distance between Guns.

11. Owing to the liability of the mechanism to interruption, the guns of a section should rarely be employed beyond supporting distance of one another; when sections are acting independently, and good cover is not available the guns should usually be not less than 25 yards apart, the average width of the area of ground struck by the bullets of an effective shrapnel.

12. As a general principle no more guns should fire than are necessary to meet the tactical requirements, the remainder being placed in concealed position ready to open fire on a favourable opportunity, or held in positions of readiness under cover, according to circumstances. It is, however, of the first importance that sufficient fire effect to attain the object in view should be produced.

Initiative of Commanders.

13. A machine gun commander should be given definite orders by the commander of the body of troops to which he belongs, as to what is required of him, but he should be allowed as much freedom of action as pos-

sible in carrying out these orders, and should be kept informed of all changes and developments of the situation which may affect his action. Initiative and enterprise are essential to the effective handling of machine guns.

14. Machine guns will usually be sufficiently protected by the dispositions of the troops with whom they are acting. Should a machine gun commander find himself in an exposed position, he should apply to the nearest infantry commander for a suitable escort if necessary.

Employment of Spare Numbers.

15. When a machine gun is in action only those numbers required to work the gun should be with it. Spare numbers, when not employed as range takers, ground scouts, ammunition carriers, or on similar duties, should be under cover in the vicinity. Groups of men close to machine guns do not facilitate the working of the gun, are apt to disclose its position and make a vulnerable target.

The limbered wagons will be unpacked in positions where they are screened from the enemy's fire and observation.

The commander of the machine gun section will arrange for the selection of a covered position for his small arm ammunition cart, as close to his guns as possible.

CHOICE OF FIRE POSITIONS.

Reconnaissance.

1. Surprise and concealment being very important factors in the employment of machine guns, their effective use depends upon the skill with which they have been brought into action.

Reconnaissance is therefore of special importance. The brigade machine gun officer if the guns are brigaded, the section officer if they are not, accompanied by range takers and orderlies, should usually be well in advance of his guns, where he can observe the action of the body of infantry with which he is co-operating. He should carefully reconnoitre suitable fire positions and make all preparations for bringing his guns rapidly into action. Alternative positions to which the guns may be moved to meet changes in the situation or to avoid artillery fire should always be selected.

Similar reconnaissances should be carried out, whenever possible, before changing position.

Choice of Position.

2. The choice of a fire position must depend upon the tactical requirements of the situation and upon the object in view; for example, it must depend upon whether it is desired to use covering, enfilade, or flanking fire, or to act by surprise.

A commanding position is favourable for the development of covering fire, while for other purposes the gun should be sighted as low as is compatible with obtaining the necessary field of fire.

Points in Good Machine Gun Position.

3. A clear field of fire, facilities for observation, a covered approach, concealment and cover for the guns and their detachments, and facilities for ammunition supply are advantages to be looked for in a good fire position, but one position will rarely unite them all. As a general principle, when the situation calls for effective fire, fire effect must not be sacrificed to obtain concealment.

In arranging for the concealment of the guns, it is important to consider the background. The neighbourhood of landmarks and the tops of prominent features should be avoided.

GENERAL PRINCIPLES OF FIRE CONTROL.

Selection of Targets.

1. The general considerations which govern the selection of a target for machine guns are—its tactical importance, its range and its vulnerability.

2. Machine guns should rarely open fire except:

(i) To facilitate movement of their own infantry.

(ii) To prevent or delay movement of the enemy.

(iii) Against a favourable target.

As soon as a machine gun opens fire its presence is disclosed, its subsequent appearance will then be watched for, and it loses to a great extent the advantage of surprise. Fire should therefore not be opened without good reason.

Effective Range for Machine Guns.

Again, fire should not be opened at ranges beyond 1,200 yards, unless a particularly favourable target offers, or a number of guns can be employed. Between 1,200 and 800 yards good effect may be anticipated from machine gun fire, and within 800 yards the greatest possible effect should be developed. If the firer can himself obtain observation, the effect of machine gun fire is appreciably increased.

3. Except under special circumstances, as, for example, when the tactical situation demands the opening of fire irrespective of the probability of obtaining material results in hits, machine guns should open fire only upon targets which are sufficiently large and dense to promise an adequate return for the ammunition expended. Thin lines of infantry in extended order are not a suitable target.

If there is no satisfactory indication of effect, and no special justification for firing

at long range exists, it will usually be better to withdraw from action and to seek other opportunities for effective intervention.

Action against Artillery.

4. Machine guns should seldom engage artillery with direct fire beyond close rifle range, for in such circumstances superiority of fire will always rest with the artillery if the machine guns are located. Within close rifle range machine guns, if concealed, should inflict considerable loss on artillery.

5. To sum up, fire should only be opened when probable results will justify it, and the tactical situation demands it. When opened, fire should be maintained so long as there is a reasonable chance of gaining the object for which it was opened. The method and volume of fire must be determined by the tactical situation, the object in view, the nature of the target, the nature of the ground, and the characteristics of the gun.

If these results are to be attained, fire must be skilfully controlled and directed by machine gun commanders.

Control by Brigade Machine Gun Officer.

6. When two or more sections are brigaded, they will act as a unit under the command of the brigade machine gun officer, who will direct the fire as regards range, point of aim, method of fire, the opening and cessation of fire, if the conditions are favour-

able, i.e., if the sections can be brought into action in such a way that the orders of the brigade machine gun officer can be heard clearly by all concerned.

If the conditions are not favourable, the orders for fire direction will be limited to indicating the objective by signal or message, and to ordering the opening and cessation of fire, all other details being left to the section officers. The latter method is to be regarded as exceptional, but it may be used on occasion to bring converging fire to bear upon the enemy.

Further reference should be made to:

FIELD SERVICE REGULATIONS, Part I,
Operations, 1909.

INFANTRY TRAINING, 1911.

MUSKETRY REGULATIONS, Part I. Re-
print, 1912.

VICKERS LIGHT MACHINE GUN

POINTS IN WHICH THE VICKERS LIGHT GUN
·303-INCH AND THE MAXIM ·303-INCH
GUN DIFFER.

Vickers Light Gun,
·303-inch.

Maxim Gun,
·303-inch.

Weight, ready for firing, 38½ lbs. (with water in casing).

67 lbs.

Length about ¾-inch shorter than the Maxim gun.

Width about 1¼-inch narrower than the Maxim gun.

Depth about 1¾-inch shallower than the Maxim gun.

The barrel casing (which has longitudinal corrugations to strengthen it, and afford greater cooling surface) is of steel.

Is of gun metal and without corrugations.

It has a gun metal shoot, in the front end of it, which acts as a guide for the barrel, when it is being replaced after stripping.

There is nothing to act as a guide for the barrel.

The rear end of the barrel casing goes back sufficiently far to permit the lead being surrounded by water whilst the gun is firing.

This greatly assists in the cooling of the barrel at the point where it is most required.

The foresight is of blade pattern, and has a protector.

The barrel casing is riveted to the breech casing.

There is no ejector tube and spring, but there is an opening at the bottom of the breech casing through which the empty cases fall to the ground.

There are two covers (front and rear). On the rear of the front cover is an extractor stop.

The tangent sight is

The chamber is not surrounded by water.

The foresight is a Barley corn, and has no protector.

The barrel casing is dovetailed into the breech casing.

Has an ejector tube, spring, but no opening.

Only 1 cover.

There is no extractor stop.

The tangent sight

placed about $\frac{1}{2}$ -inch from the rear end of the breech casing and the sight is U pattern.

When down, the tangent sight rests on a bridge which is solid with the rear cover, thereby strengthening it.

The rear cover lock has to be lifted to open.

The cover is fitted with 2 steel ramps in lieu of 2 cover springs, and has no gun metal block.

On the inside of the rear cover are guides for the outside plates to fit into.

There is also the trigger bar, which is of steel.

On the right hand plate is the check lever, which is about the centre of the breech casing, near the bottom edge.

is about 3-ins from the rear end of the breech casing, and the sight is a V.

The cover lock has to be pushed in to open.

There are no guides

Trigger bar of gun metal, and runs along inside of bottom plate.

The check lever is fitted near the rear end of the breech casing.

There is no buffer spring or resistance piece.

The check lever has a small spiral spring and piston inside it. This causes the crank handle to be momentarily held down while the breech is closed.

The slide, right, carries the roller.

On the outside of the left hand plate is an elevating stop.

There is no stud for the shoulder piece.

On the inside of both plates, are the cams for controlling the path of the backward movement of the horns of the extractor.

These cams are solid with the plates.

They have a step near the rear end which prevents the lock going forward if it has not travelled

Has no spiral spring or piston.

Has a resistance piece and buffer spring in lieu of roller.

There is no elevating stop.

Cams are riveted to the side plates.

They have no stop.

back far enough to allow the extractor to clear the cams.

The rear cross piece is of steel. It is joined to the outside plates at the bottom by a screwed joint pin.

There are guides cut in it, into which fit the ends of the outside plates.

The handles are of wood with steel cylinders for oil.

The barrel is browned. With the barrel of the Maxim gun, which is coppered, it is possible for rust to form under the copper without being detected. The outside of the barrel must be oiled after the gun has been used.

There is a groove round it near the muzzle in which lies the body of the clamping screw of the muzzle attachment.

Is of gun metal. The rear cross piece is connected to the outside plates by dovetails and fixing pin.

Are of gun metal and form oil bottles.

The barrel need not be oiled after firing.

There is no groove.

The front of the barrel block bears against the rear end of the barrel casing.

There is no gun metal valve.

The left side plate has no connecting rod spring.

Both side plates have side plate springs.

Connecting rod has an adjusting nut and washers.

The crank handle revolves in a direction opposite to that in which they work in the Maxim gun.

The lock, which is inverted, as compared to the lock of the Maxim gun, is joined to the connecting rod by means of an interrupted flange.

The lock has no extractor spring, as the cases are free to fall off the extractor when clear of the barrel.

The lock casing has a

Has a connecting rod spring.

Only the right side plate has a spring.

Has cotter and washers to adjust by.

Is joined by an interrupted screw.

The lock spring

piece riveted inside at the top, which acts as a guide for the lock spring. No axis pin is required to keep it in position.

The whole lock can be easily stripped by means of the hand screw which forms the axis pin of the trigger bar lever.

The feed block is of steel. Has no band roller.

The top pawls are made with finger pieces and can be pressed down by hand to allow the belt to be released.

They have only one spring, which is removable.

The bottom pawls are joined together by a finger piece.

The fusee spring box is of steel.

The fusee spring can be adjusted without removing the box, as the vice pin of the screw is loose.

is kept in position by an axis pin.

Drifts and mallet required to strip the lock.

Is of gun metal.

An implement has to be used. Has 2 springs, which are riveted.

Has no finger piece.

The bottom pawls are separate.

Is of gun metal.

To adjust the spring the box has to be removed, the vice pin being fixed,

The fusee has a clutch fixture, and is easily removable.

prevents the screw from turning when on the gun.

The fusee is screwed into the crank and cannot be so quickly removed.

GENERAL ADVANTAGES OF LIGHT GUN.

- (a) Lightness.
- (b) Simplicity in stripping and assembling.
- (c) Greater general strength, especially of recoiling portions. (Side levers have been subjected to withstand a pressure of 75,000 lbs.).
- (d) No tools required to strip the lock or change barrel.
- (e) Better means of safety, e.g., gun cannot be fired unless the cover is down.
- (f) Faults in feed more easily rectified.
- (g) Having no ejector tube, economizes space, in depth.
- (h) Reverse action of crank shortens breech casing.

ACTION OF THE MECHANISM.

Loading.

To load the gun (a) pass the tag end of the belt through the feed block from the right side, (b) with the right hand pull the crank handle on to the roller, (c) with the left hand pull the belt straight through as far as it will go, (d) let go the crank handle; the first cartridge will then be gripped by the extractor. Repeat the above and, when this has been done, the first cartridge will be in the chamber and another gripped by the upper part of the extractor.

The gun is then ready for firing.

On raising the safety catch and pressing the thumb-piece the gun will fire automatically until pressure is released. The lock will then be home, and the extractor will be gripping (a) a live cartridge in the feed block and (b) a live cartridge in the chamber.

EFFECT OF THE FORCE OF THE EXPLOSION OF THE CHARGE.

Suppose the gun to have just fired; the extractor will be gripping a live cartridge in the feed block and the empty case, which has just been fired, in the chamber; the explosion will cause the recoiling portion to move backwards through a distance of about $\frac{1}{2}$ an inch, thereby extending the fusee spring.

Action in feed block.—A recess in the prolongation on the left side plate actuates

a stud on the bottom lever of the feed block. The bottom lever acts on the top lever, which moves the slide and the top pawls to the right, to engage behind the cartridge held in place by the bottom pawls.

Rotation of the crank.—The backward movement of recoil causes the tail of the crank handle to roll against the roller, thereby rotating the crank. The rotation of the crank draws back the lock, and causes the fusee to wind the fusee chain round it, and thus further extend the fusee spring.

The continued rolling of the crank handle against the roller, assisted by the fusee spring, forces the whole of the recoiling portions forward again, with the exception of the lock, which continues its backward movement for about another inch, and then goes slightly forward again.

As the recoiling portions go forward, the recess in the prolongation on the left side plate actuates the stud on the bottom lever of the feed block. This bottom lever acts on the top lever, which moves the slide and the top pawls to the left, the pawls thus bringing a fresh cartridge in the belt to a position against the cartridge and bullet stops, ready to be gripped by the extractor.

The belt, as it moves to the left, slides over the bottom pawls, which are depressed as the cartridge passes over them, and rise behind the second cartridge, holding the belt in position and preventing it from sliding back

after the first cartridge has been withdrawn by the extractor.

The Lock.—As the lock moves backwards the extractor withdraws the empty case from the chamber and a live cartridge from the belt in the feed block. The horns of the extractor move along the upper surface of the solid cams until the cartridge is clear of the belt. When the extractor arrives at the rear end of the cams it is forced down by the ramps in the cover, thus bringing the cartridge drawn from the feed block in line with the chamber, and causing the empty case drawn from the chamber to fall off the extractor. The live cartridge is prevented from slipping down the face of the extractor by the bottom projection of the gib.*

Cocking action.—The rotation of the crank gives an upward motion to the connecting rod and side lever head, which latter, bearing on the tail of the tumbler, rotates it on its axis, and thus forces the firing pin to the rear. The long arm of the lock spring acts on the projection of the firing pin, while the short arm bears against the nose of the trigger; consequently the withdrawal of the firing pin compresses the lock spring by drawing the long arm towards the short arm. As the tumbler rotates, the nose of the trigger

* If the empty case does not fall off when the extractor drops, it will be forced off by the seating for extraction on the trunnion block when the extractor rises.

is forced by the short arm of the lock spring into the bent of the tumbler, and the continued motion of the tumbler forces the firing pin still further back, until the bent of the sear (which is actuated by the sear spring) is forced into the bent of the firing pin and retains it. The firing pin is thus prevented from flying forward.

ACTION OF THE FUSEE SPRING.

When the force of the explosion is expended, the action of the fusee spring comes into play, continuing the forward movement of the barrel, side plates, and unwinding the fusee chain from the fusee. This gives the crank a rotary motion, which is imparted to the connecting rod and the side lever head, causing the lock to continue the forward movement and place the live round in the chamber. The extractor is moved upwards by the side levers acting on the extractor levers. The bottom projection of the gib slides over the base of the live cartridge in the chamber and the top projection of the gib slides over the base of the cartridge which has been automatically moved up into position in the feed block. The firing pin hole is thus brought opposite the cap.

As soon as the extractor reaches its highest position, the side plate springs engage in slots in its sides and retains it there. If the bents of the side and extractor levers are worn, the extractor might otherwise fall again, and

the horns fail to clear the solid cams in the backward movement. This, however, can only occur when there are no cartridges on the face of the extractor.

The further downward movement of the connecting rod and side lever head, together with the bents of the side and extractor levers, cause the lock to be forced slightly further forward and the breech is then closed.

Firing action.—(a) For the first shot. As the side lever head is brought slightly below the horizontal, it depresses the sear, thereby disengaging it from the firing pin, which then moves slightly forward until the bent of the tumbler engages the nose of the trigger. If the safety catch is raised and the thumb-piece on the firing lever pressed, the pawl near the bottom of the firing lever pushes forward the bottom of the trigger bar lever. This, being pivoted in the centre, causes the top to come to the rear engaging a projection on the trigger bar and drawing it to the rear. As the trigger bar is drawn backwards the front end of the recess engages and draws back with it the tail of the trigger, thereby releasing the tumbler. The long arm of the lock spring then propels the firing pin on to the cap and the cartridge is exploded.

(b) For subsequent shots.—The firer, by maintaining pressure on the thumb-piece, holds back the trigger bar. Therefore, each

time the lock goes forward the front end of recess holds back the tail of the trigger before the lock is quite home. By this means the nose of the trigger is prevented from engaging in the bent of the tumbler. When the lock is home, the side lever head depresses the sear, thus permitting the long arm of the lock spring to carry the firing pin on to the cap and the charge is exploded.

The depression of the sear is so timed that the firing pin cannot be released until the lock is in the firing position.

On releasing the thumb-piece, the short arm of the lock spring forces the nose of the trigger under the bent of the tumbler, so that when the sear is depressed, the nose of the trigger engages in the bent of the tumbler, and the firing pin is unable to go forward.

Unloading.

To unload the gun.—Pull the crank handle on to the roller twice in succession, letting it fly forward to the check lever each time; press up the bottom pawls and remove the belt from the feed block—then release the lock spring.

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